Early Brain Development, Epigenetics and the Need for Community Action

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Kiwanis INDIANA

Indiana State Department of Health
Children's Special Health Care Services

CHIP IN FOR QUALITY
CHILD HEALTH IMPROVEMENT PARTNERSHIP INDIANA

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- Medical director of Child Health Improvement Partnership – Indiana or CHIP-IN

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No financial disclosures

Critical Points

1. Brain grows rapidly in first 3 years of life
2. Genes serve as a blueprint for brain architecture but “epigenetic” mechanisms determine what is turned on and off
3. There is an intersection of neurobiology and epigenetics that determines the brain architecture – i.e., circuits and connections
   a) That get used get stronger
   b) That aren’t used get pruned

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Critical Points

4. Early experiences can change brain development

5. Importance of developmental screening

6. We can do something about it

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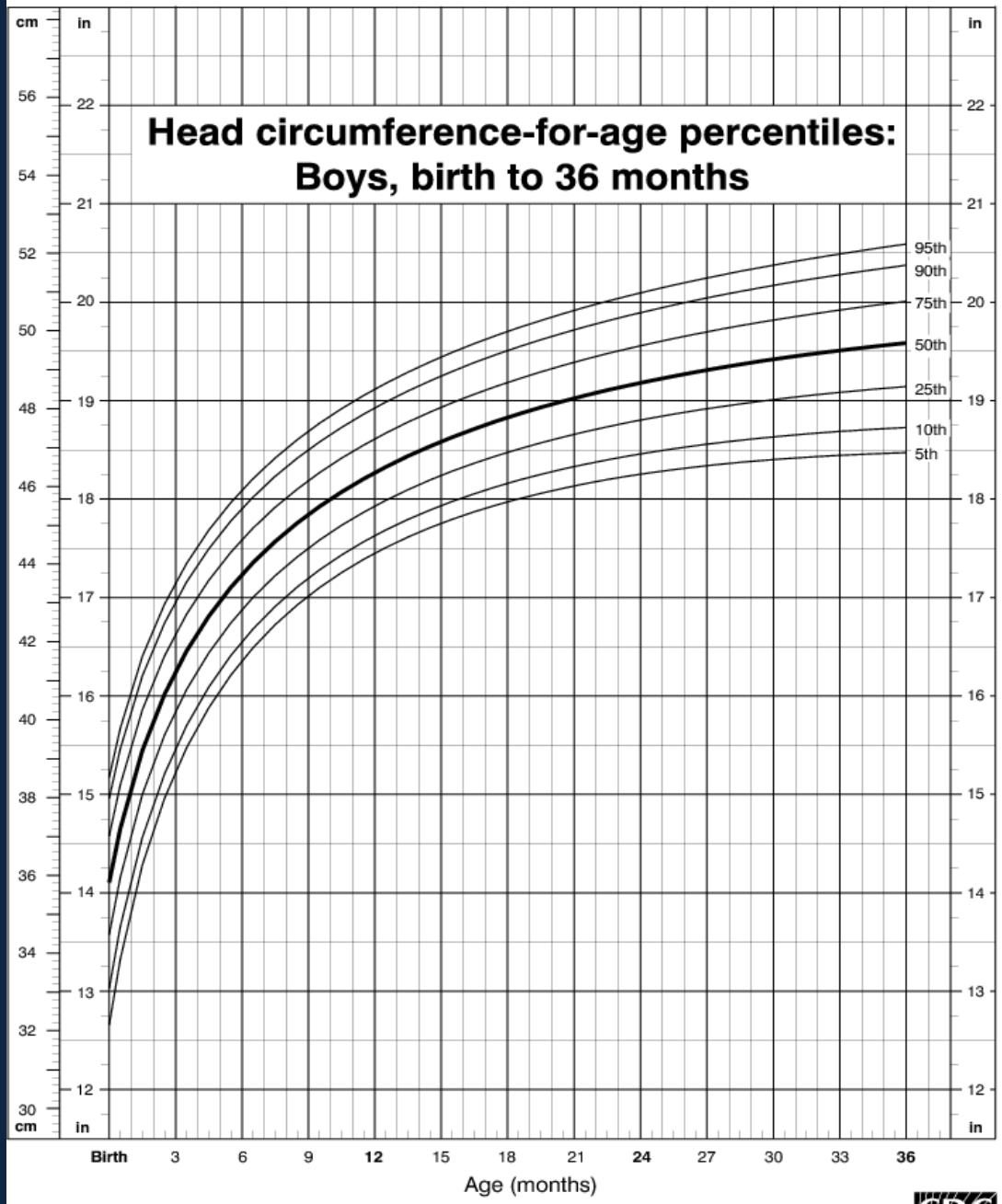
CDC Growth Charts: United States



Published May 30, 2000.
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

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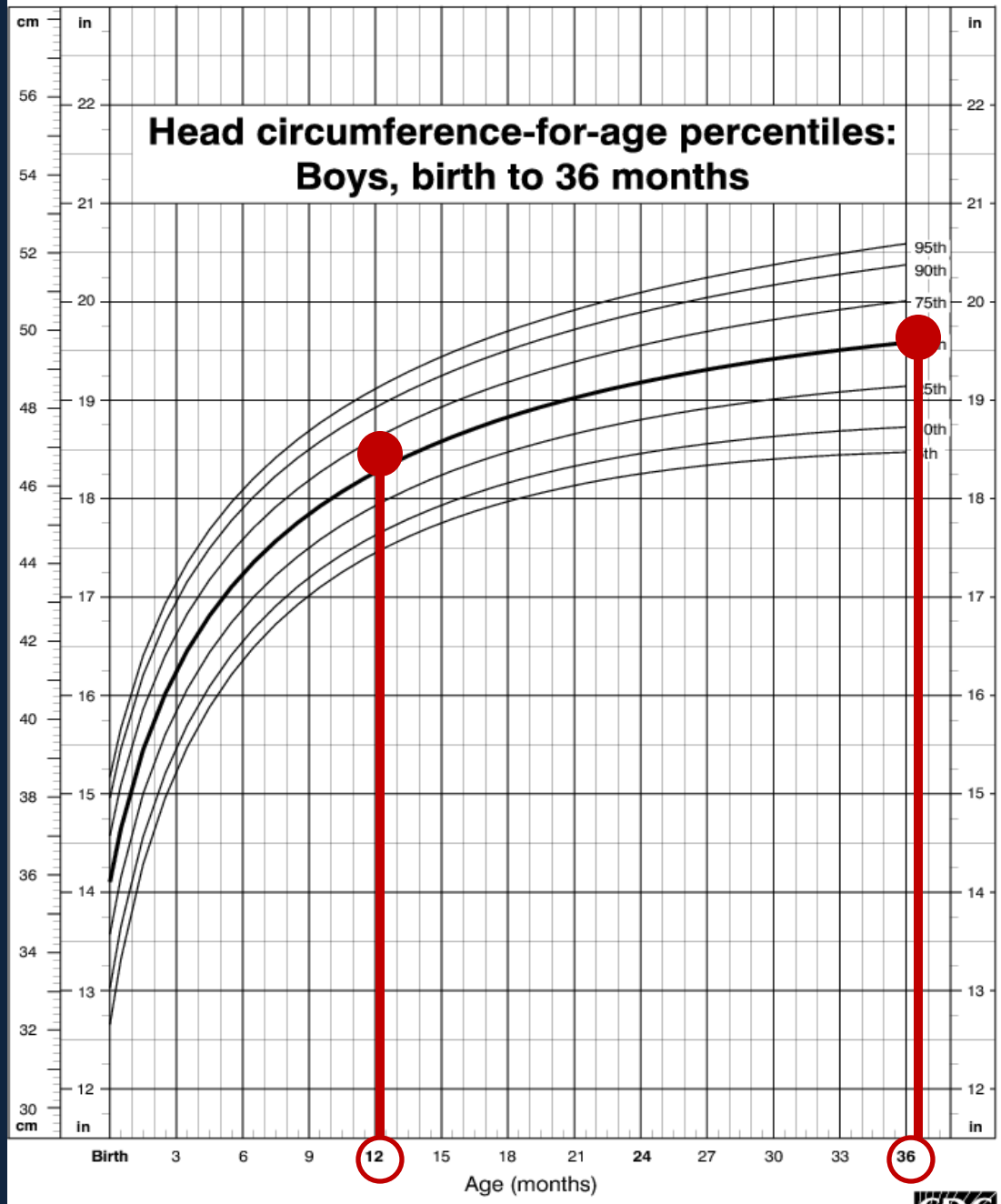
CDC Growth Charts: United States



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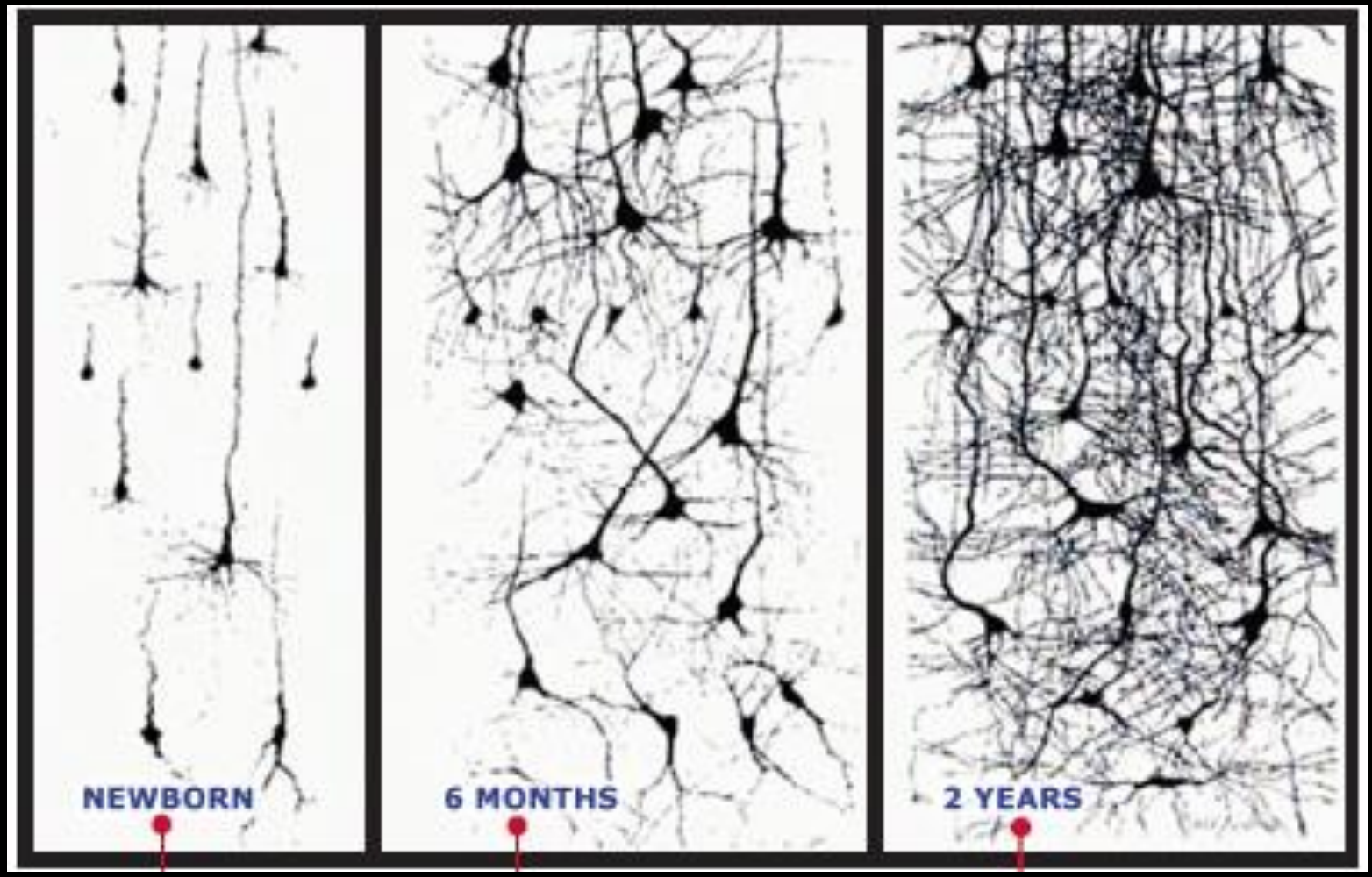
Neurodevelopmental Biology

Brain is not structurally complete at birth



Birth 6 months 2 years old

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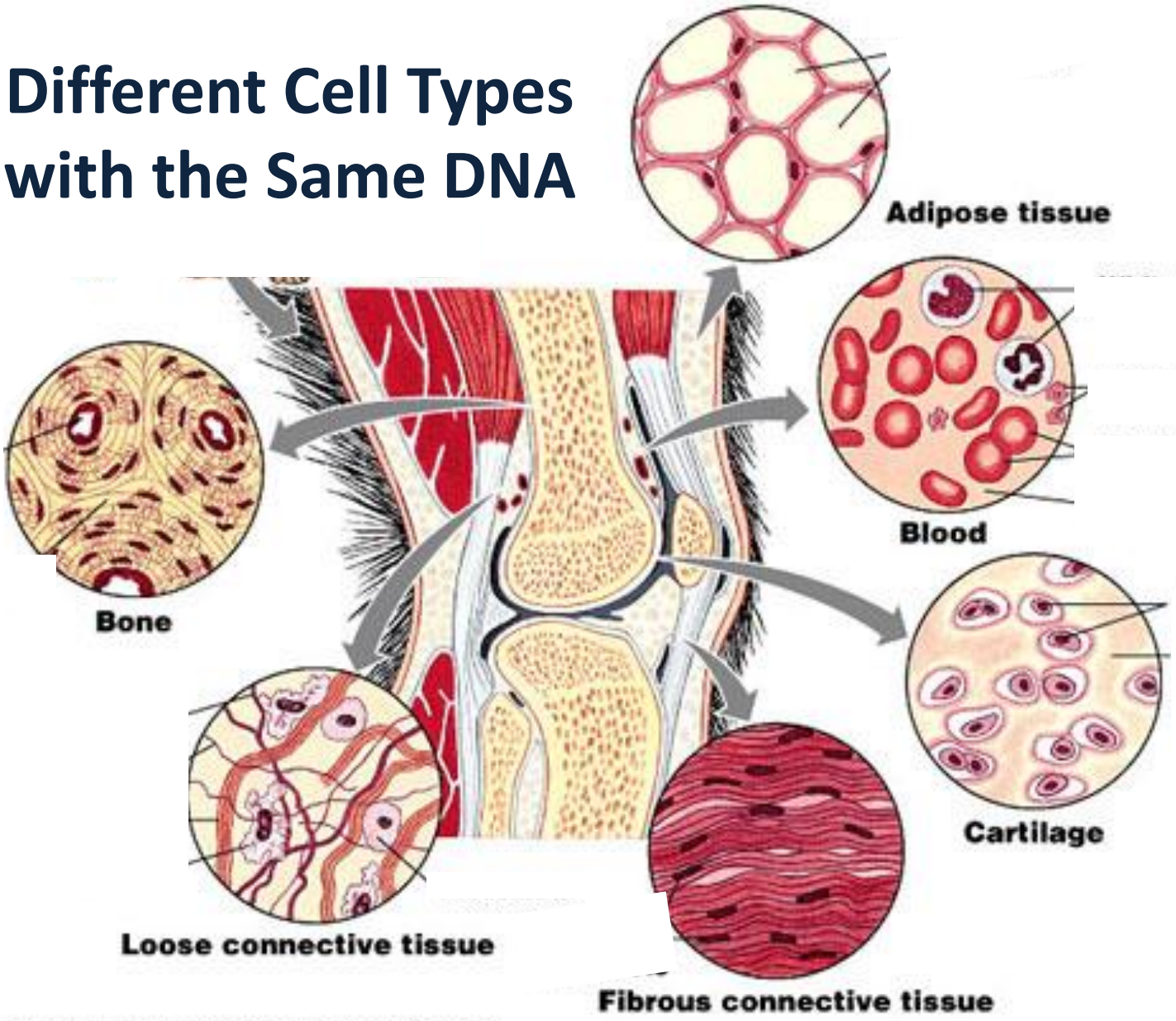
Deoxyribonucleic acid (DNA)

- Carries genetic information
- Determines our characteristics
- Is the same in every cell

Different Cell Types with the Same DNA



Epigenetics

- Information on top of DNA code –
  - turn the gene expression on and off
  - silencing some genes and activating others

- Two main mechanisms
  - **DNA Methylation**: suppresses gene expression
  - **Histone Acetylation**: makes gene expression easier

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Epigenetic mechanisms not *only* occur during fetal development, when cells are specializing

BUT also continues after birth and is influenced by the environment and our experiences!

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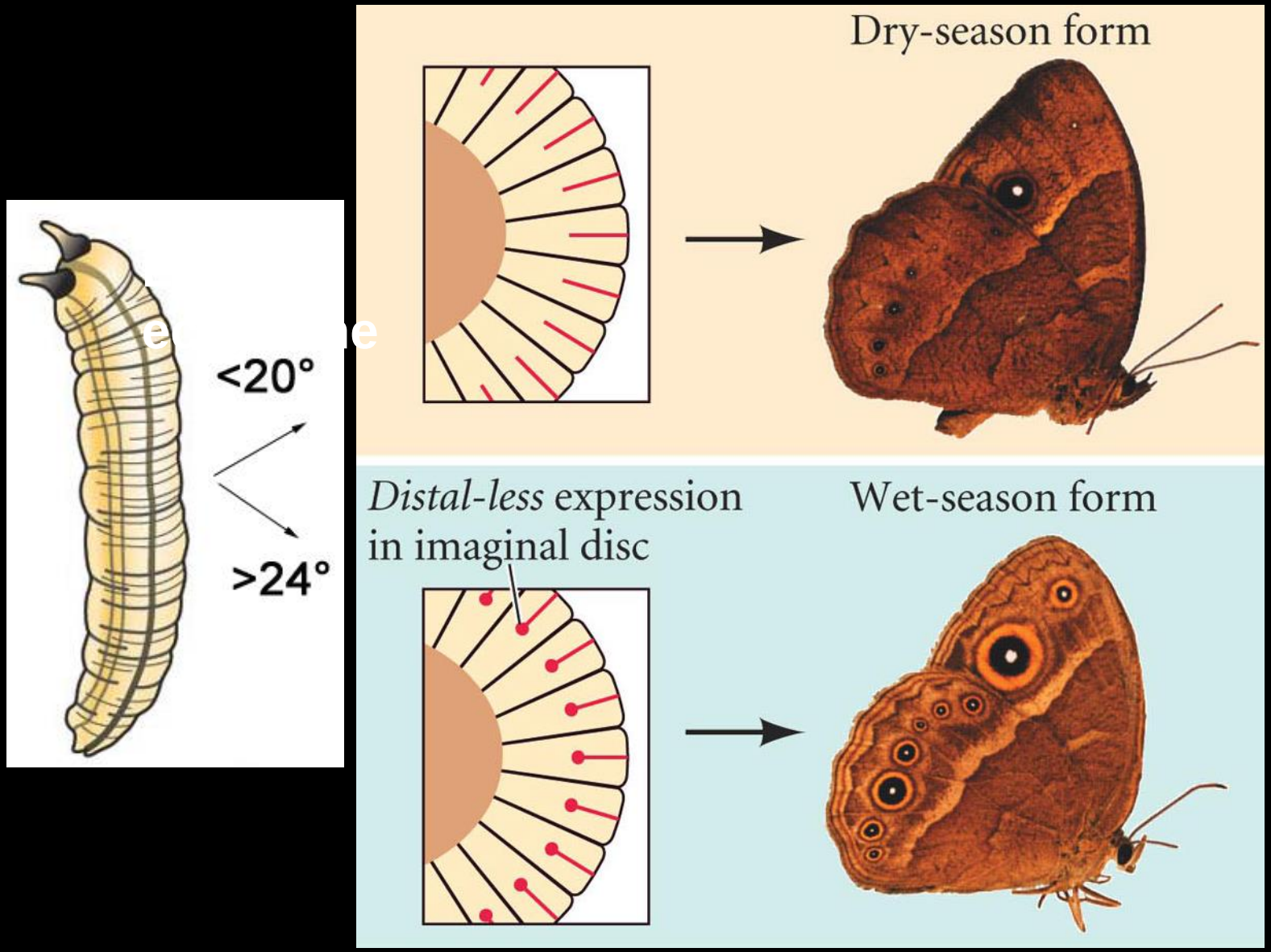
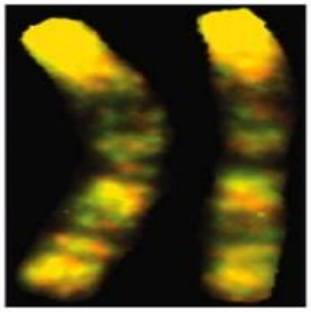
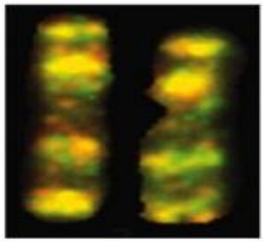
Temperature-Dependent Appearance *Bicyclus*

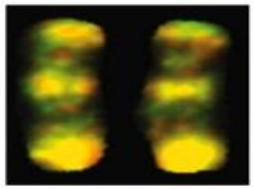


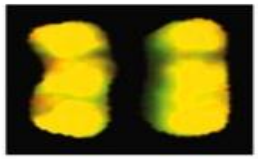
Genetically Identical

Different Disease

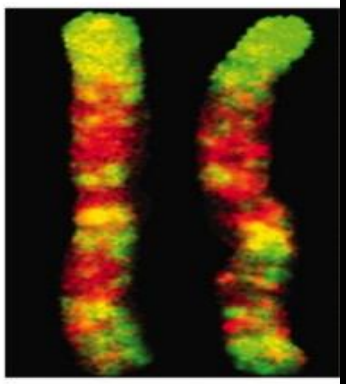


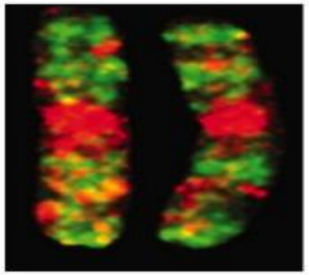


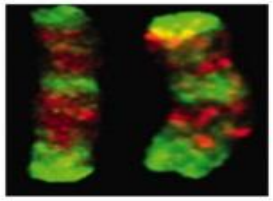


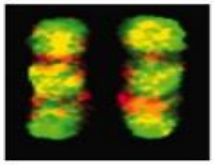


3 year old identical twins









60 year old identical twins

Critical Points

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Brain Grows Rapidly Followed by Pruning

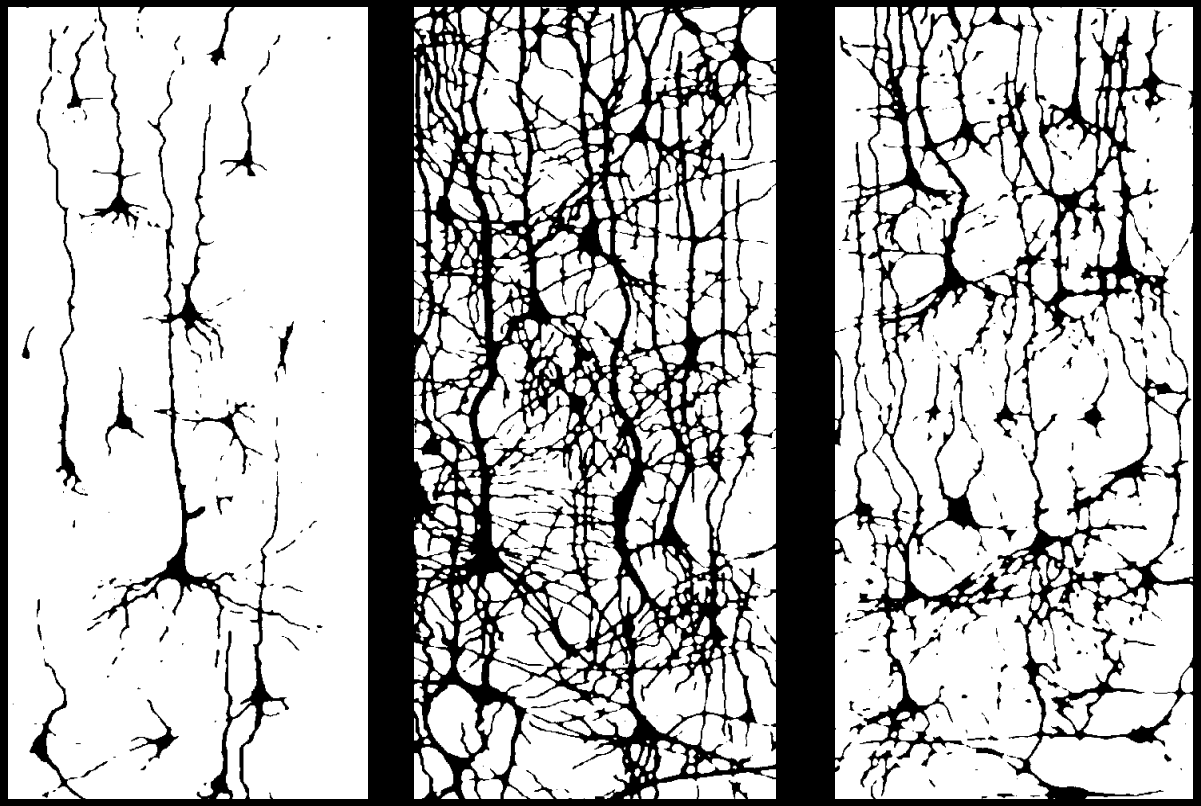
Rapid growth

Birth

6 years old

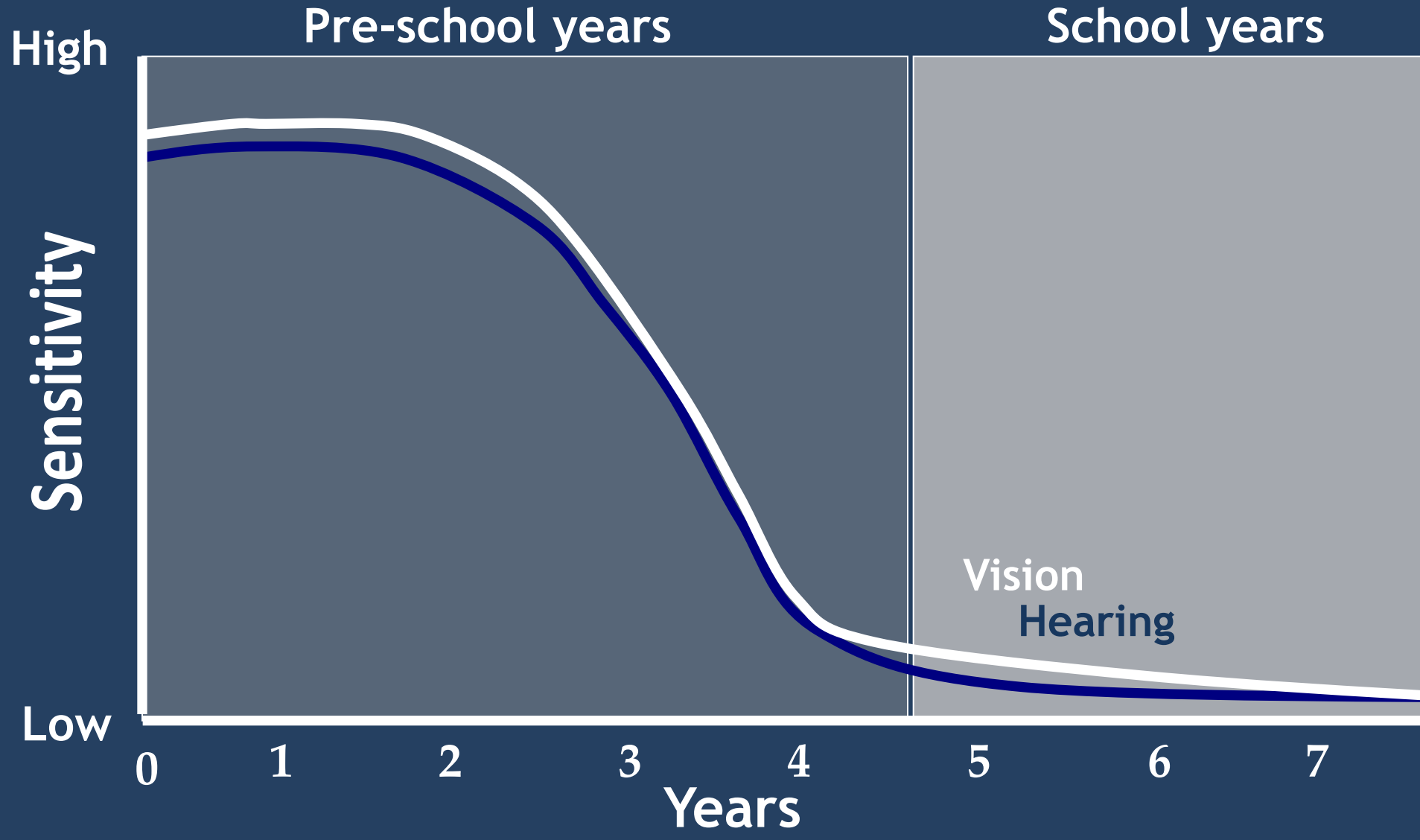
Brain Grows Rapidly Followed by Pruning

Rapid growth Pruning



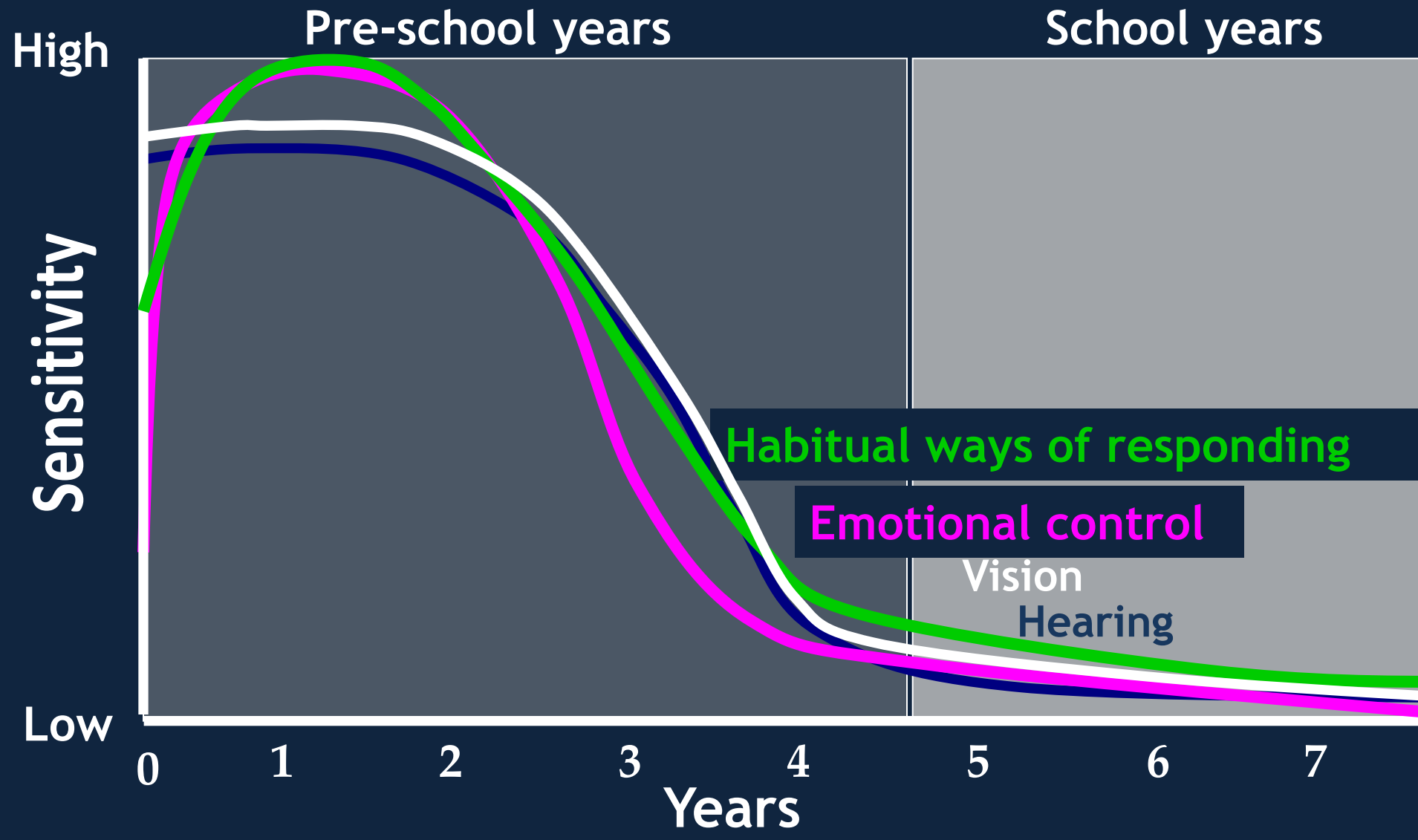
Birth 6 years old 14 years old

Sensitive Periods in Early Brain Development



Graph developed by **Council for Early Child Development** (ref: Nash, 1997; *Early Years Study*, 1999; Shonkoff, 2000.)

Sensitive Periods in Early Brain Development



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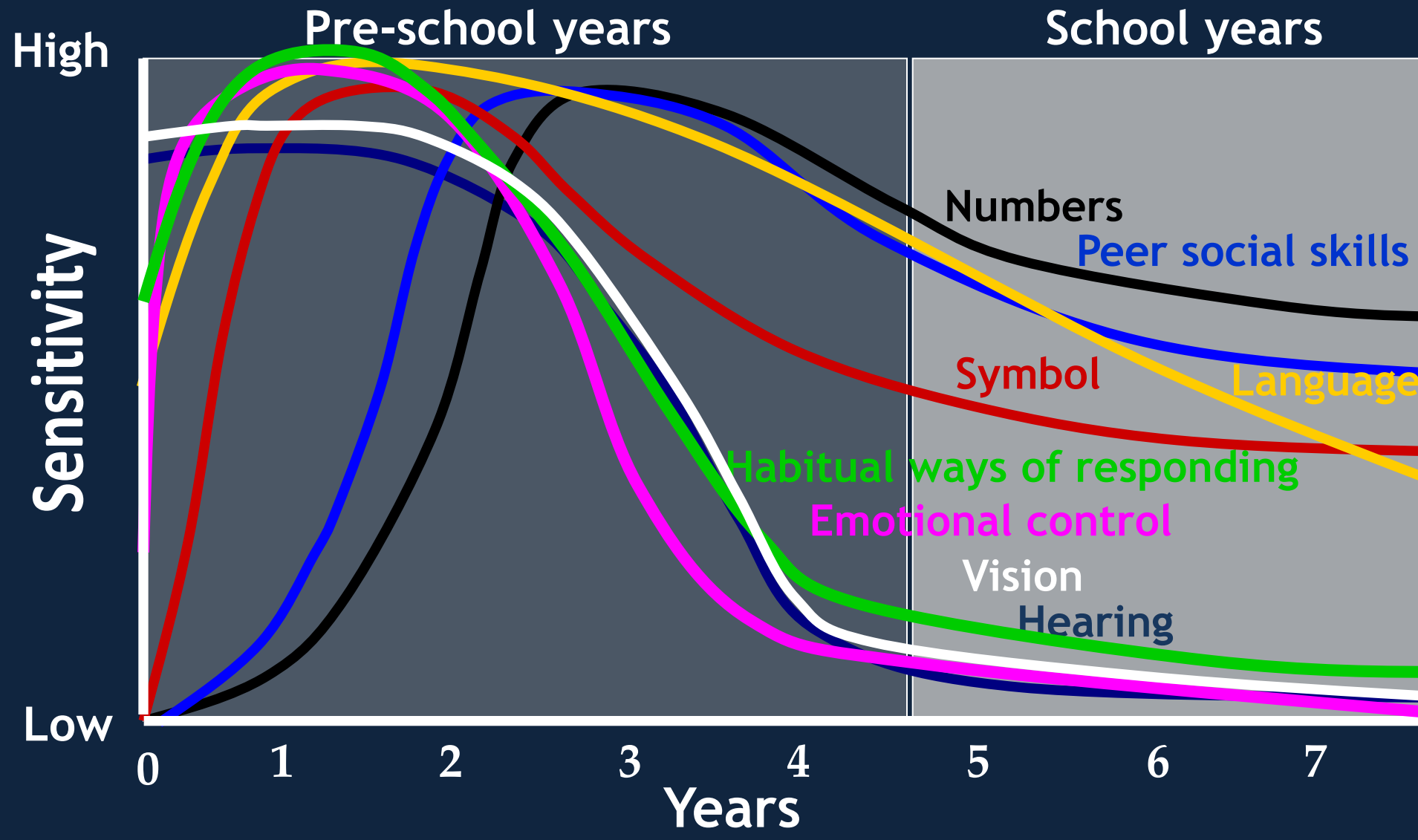
Sensitive Periods in Early Brain Development



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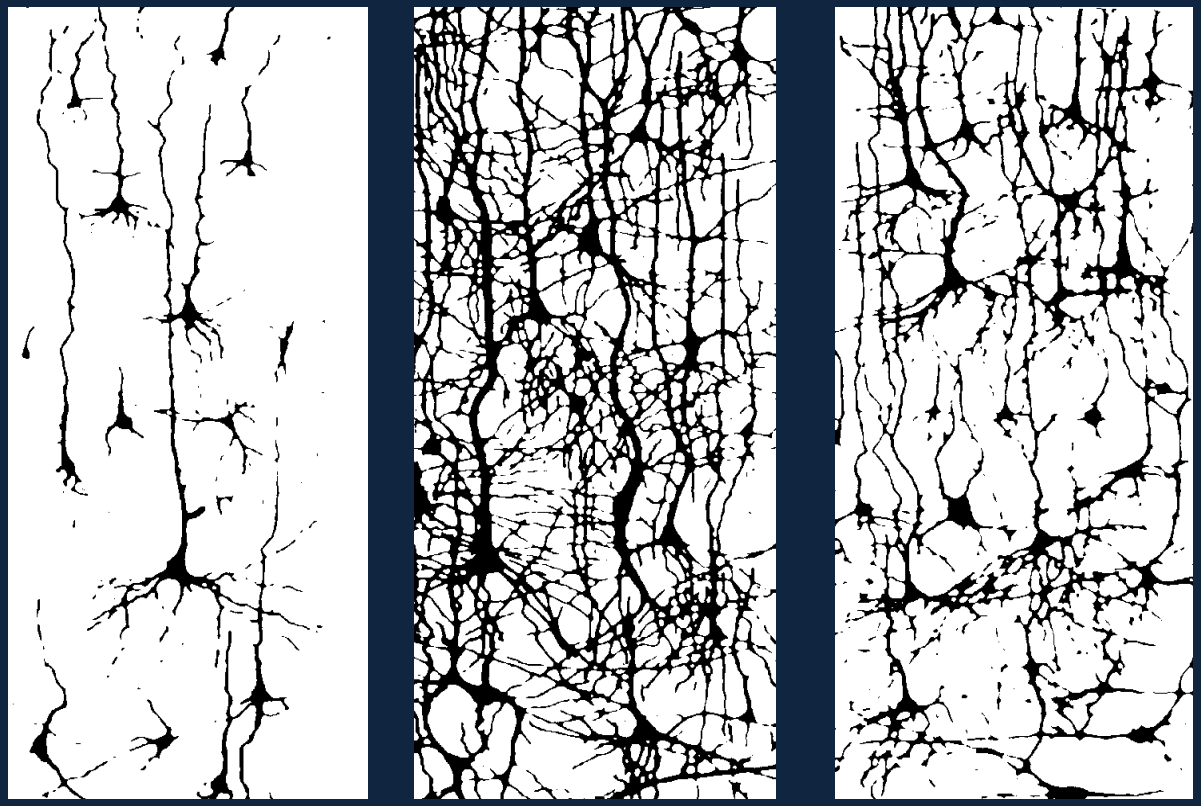
Brain Grows Rapidly Followed by Pruning

Rapid growth Pruning



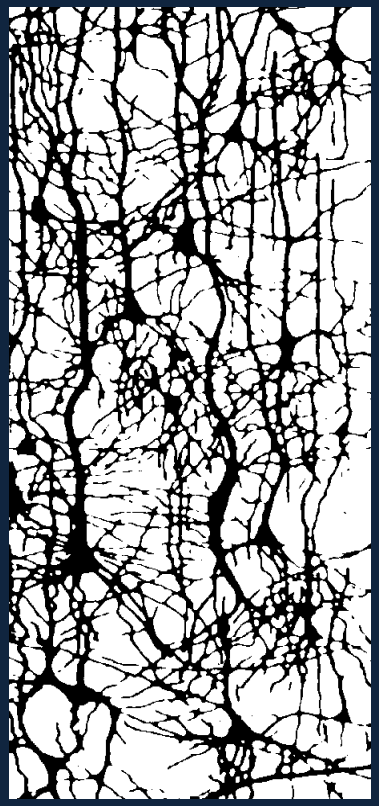
Birth 6 years old 14 years old

Brain Grows Rapidly Followed by Pruning

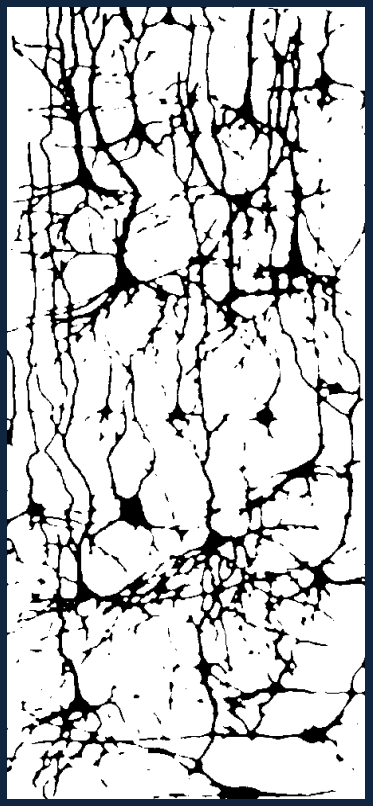
Rapid growth

Pruning

Birth



6 years old



14 years old

Politician

Critical Points

4. Early experiences can change brain development
5. Importance of developmental screening
6. We can do something about it

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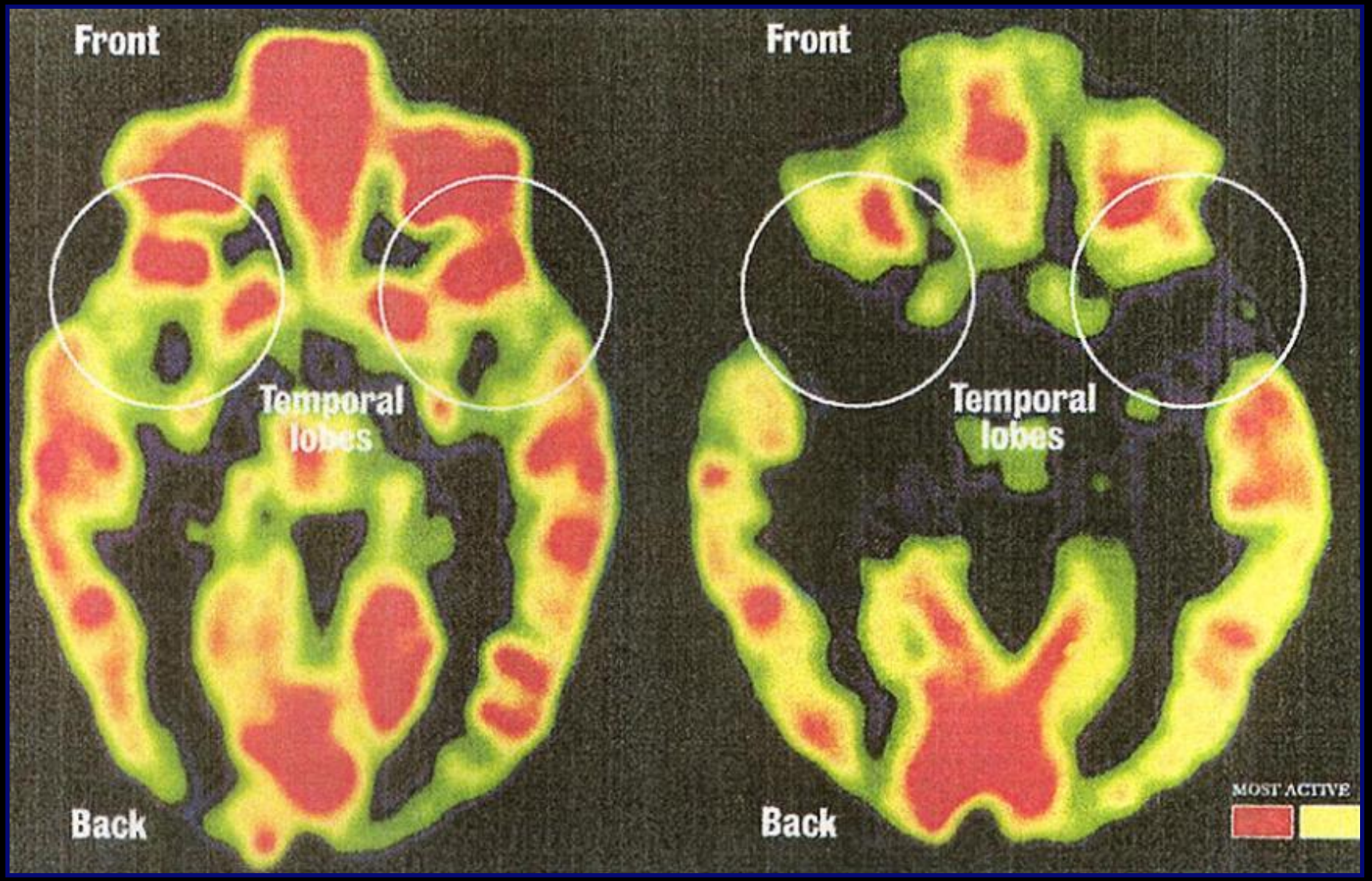


Healthy Child

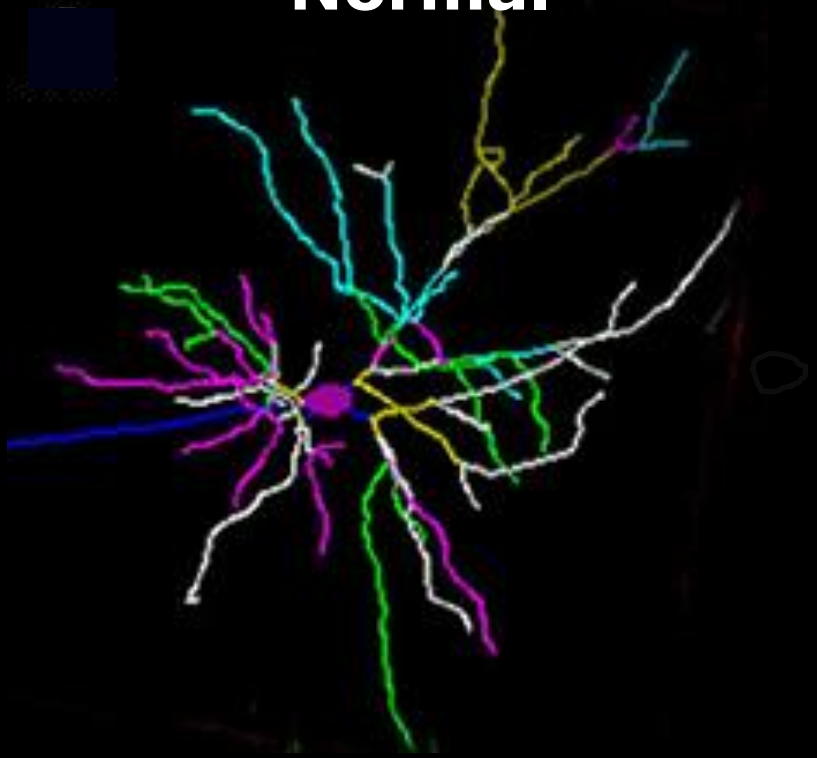
Severe Neglect

Toxic Stress Changes Brain Architecture

Radley et al. (2004) ; Bock et al. (2005)

Prefrontal Cortex and Hippocampus

Normal



**Typical neuron—
many connections**

Toxic stress

**Damaged neuron—
fewer connections**

Family Stress, Cortisol & Brain Development

- Early Social-Emotional Functioning and Public Health: The Relationship Between Kindergarten Social Competence and Future Wellness
  - Jones, et.al. American Journal of Public Health July 16, 2015
  - Followed children for 13-19 years
  - Social-emotional skills in kindergarten were associated with key young adult outcomes – education, employment, criminal activity, substance use and mental health

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Family Stress, Cortisol & Brain Development

- Tracing Differential Pathways of Risk: Associations Among Family Adversity, Cortisol and Cognitive Functioning in Childhood
  - Suor, et. al., Child Deveopment 2015
  - 201 low income children followed for 3 years
  - Family instability and emotional maternal unavailability predicted abnormal cortisol levels and lower child cognitive function at age 4

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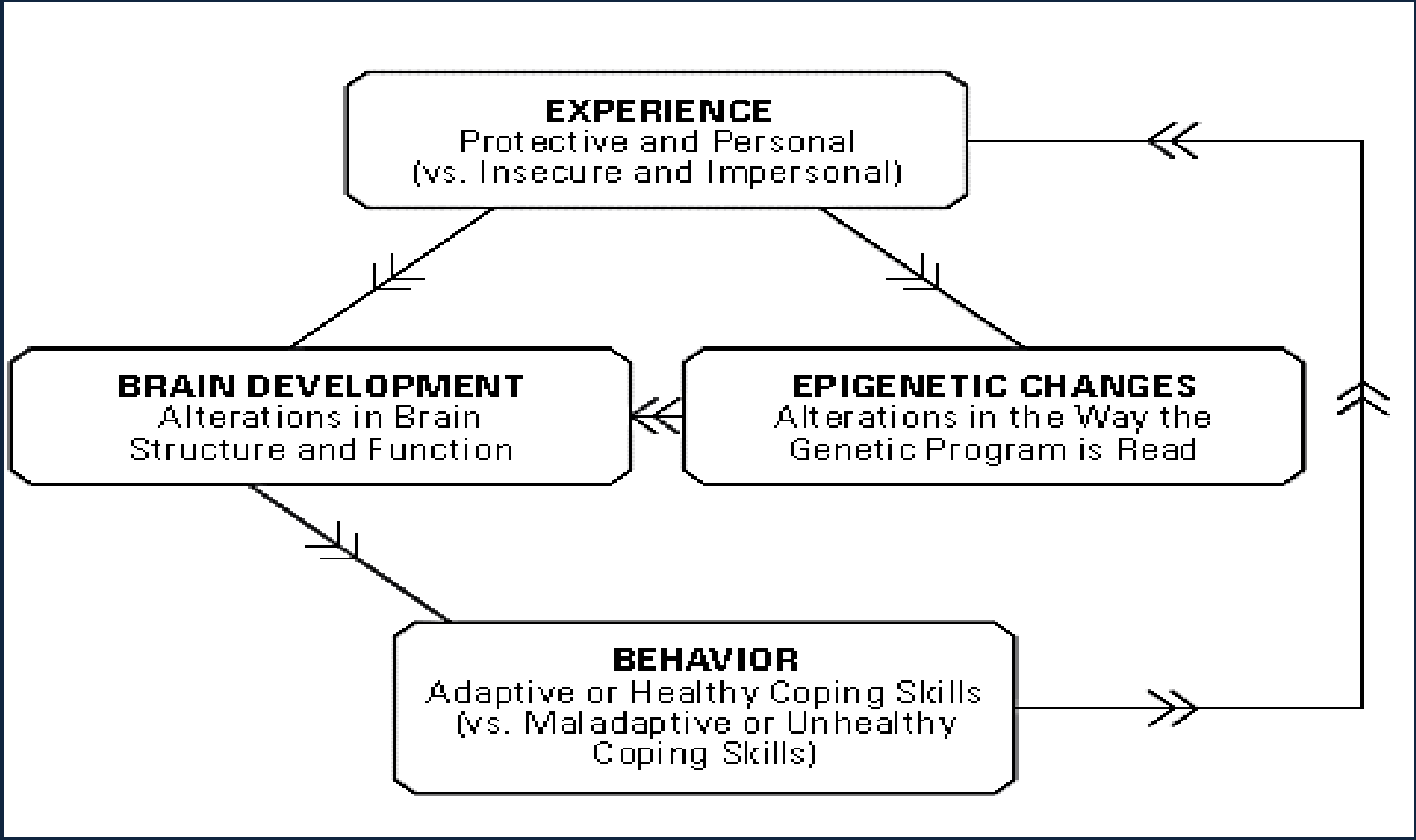
Social Interactions Affect Neuroendocrine Function and Behavior



Helping Foster and Adoptive Families Cope with Trauma
American Academy of Pediatrics

Three Levels of Stress

National Scientific Council on the Developing Child, Shonkoff

Positive

Brief increases in heart rate, mild elevations in stress hormone levels.

Tolerable

Serious, temporary stress responses, buffered by supportive relationships.

Toxic

Prolonged activation of stress response systems in the absence of protective relationships.

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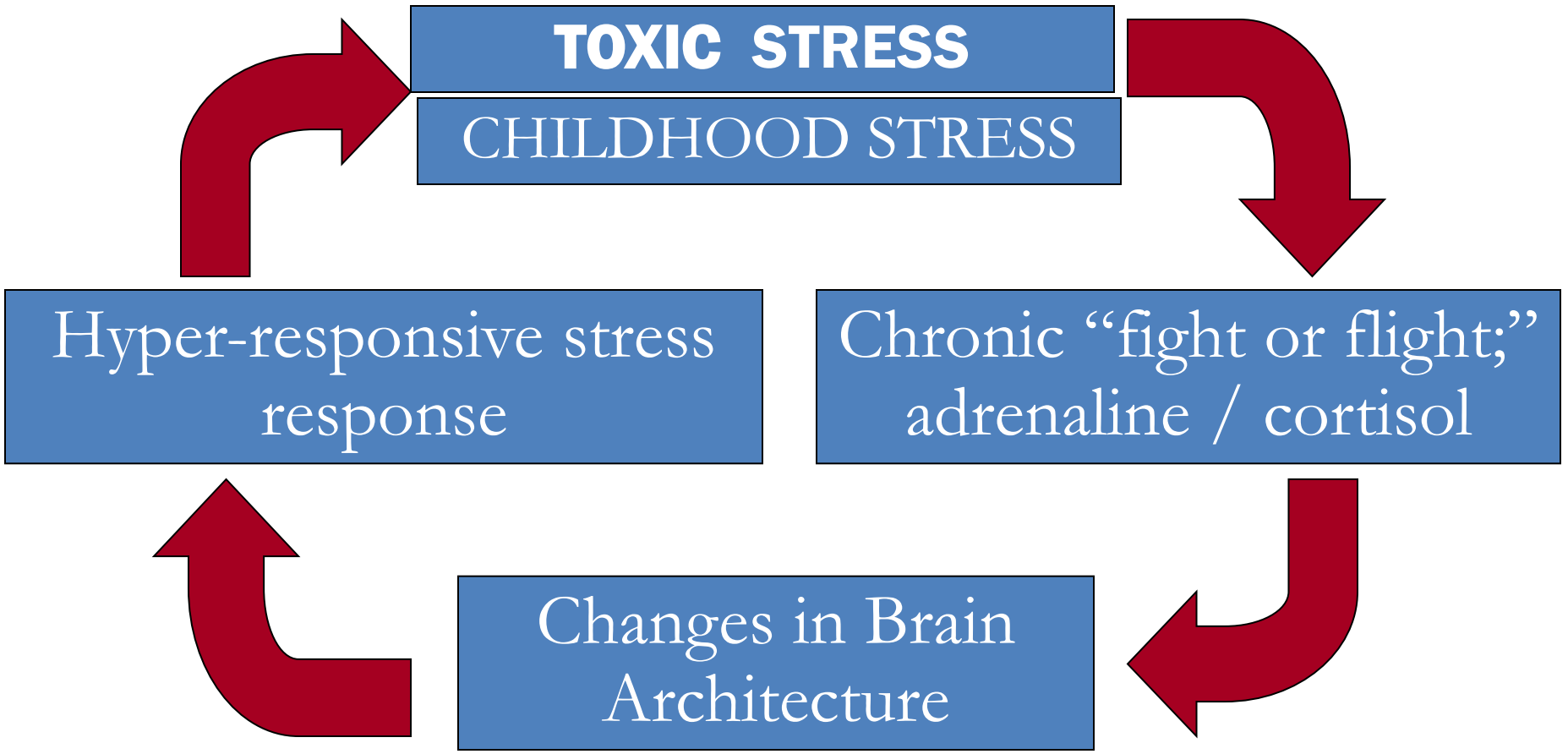
Early Toxic Stress, Neuroendocrine Function & Brain Architecture



Garner, Translating Developmental Science into Healthy Lives

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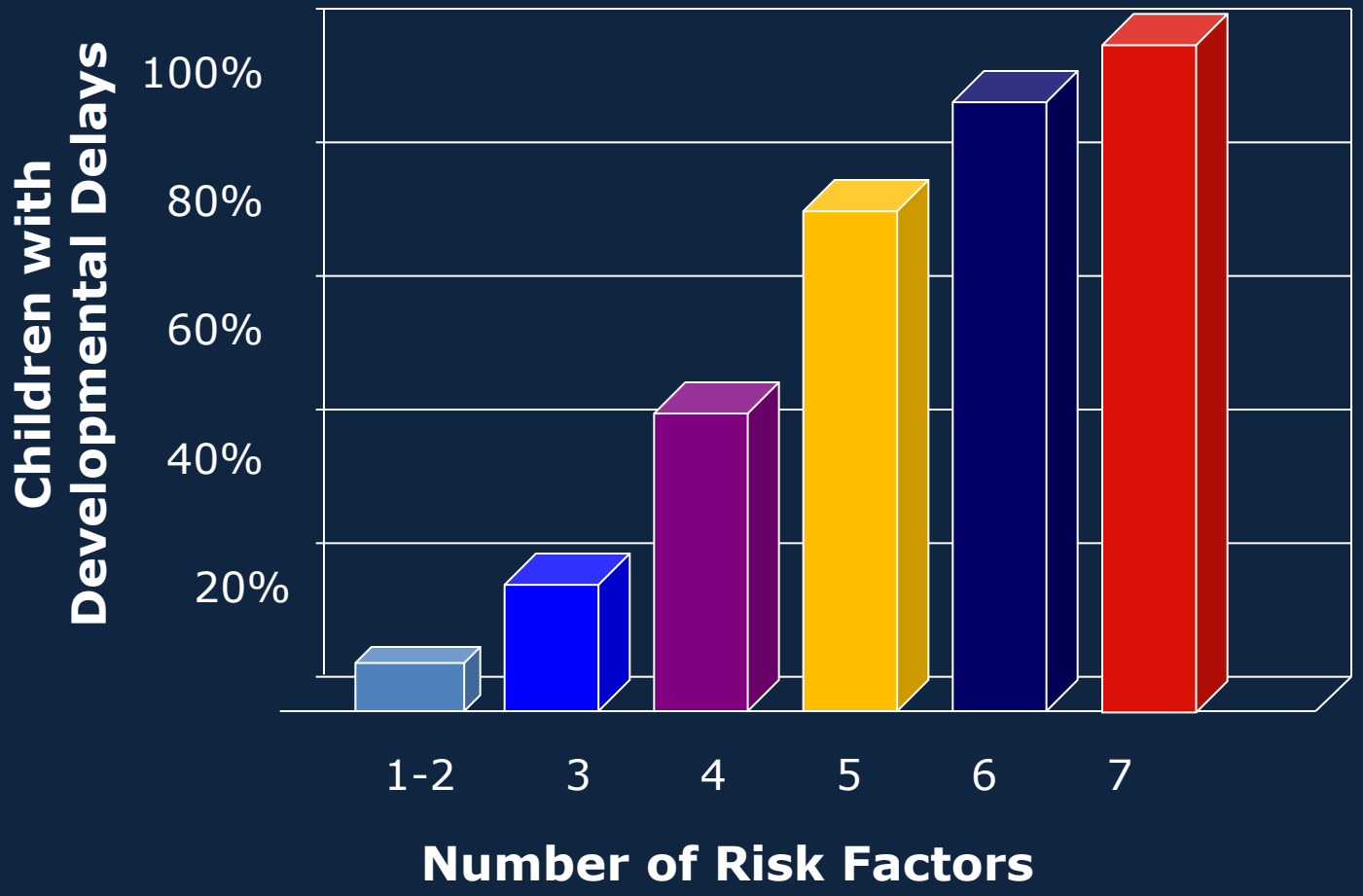
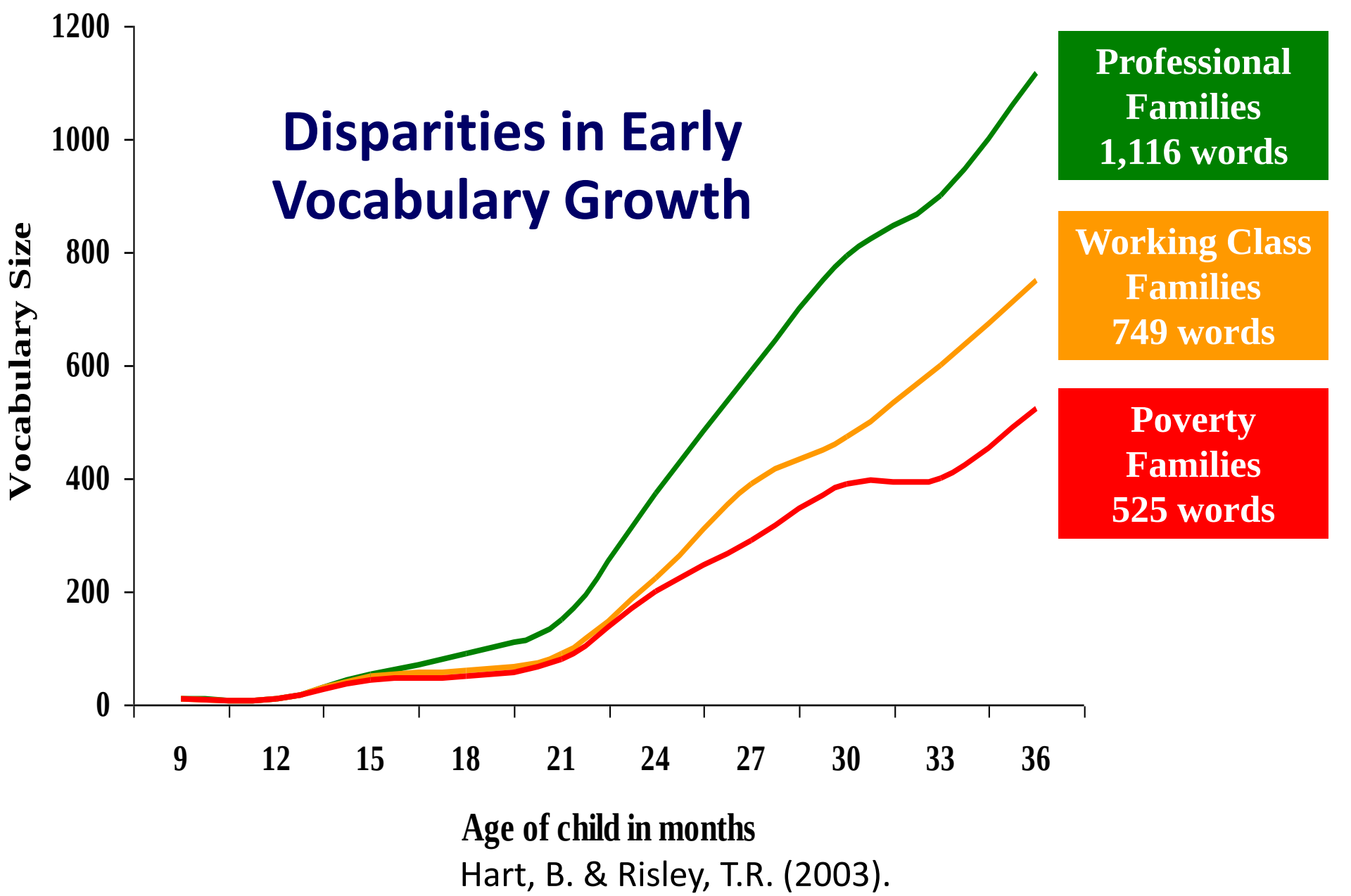
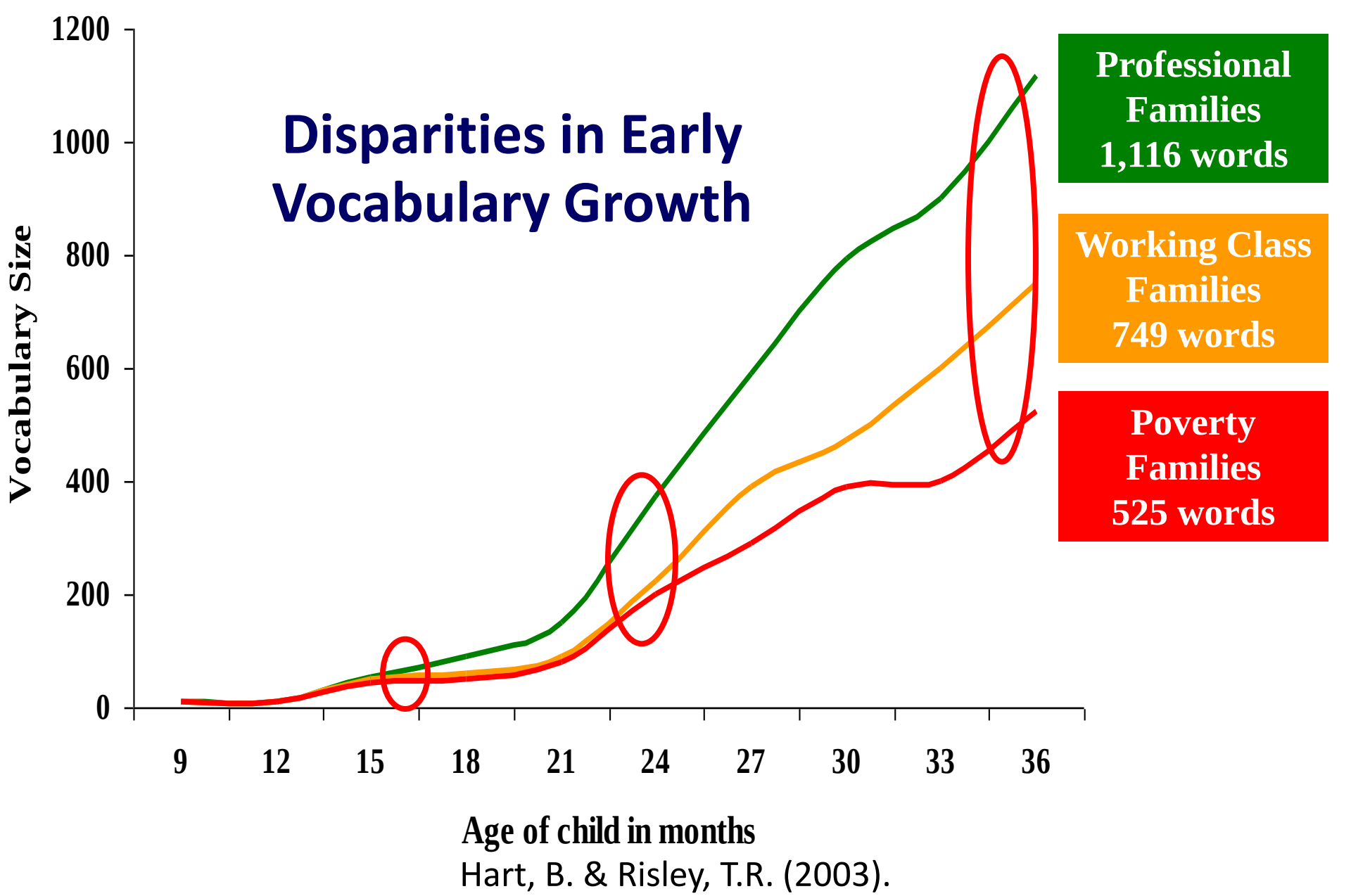
Significant Adversity Impairs Development in the First Three Years (ACE Study)



Barth, et al. (2008)



Hart, B. & Risley, T.R. (2003).



Hart, B. & Risley, T.R. (2003).

The Early Catastrophe: The 30 Million Word Gap by Age 3

Experience Can Change the Actual Structure of the Brain

- Brain development is “activity-dependent”
- Every experience excites some neural circuits and leaves others alone
- Neural circuits used over and over strengthen, those that are not used are dropped resulting in “pruning”

From presentation entitled: Nurturing the Developing Brain in Early Childhood; Lisa Freund, Ph.D. The National Institutes of Health; The *Eunice Kennedy Shriver;* National Institute of Child Health and Human Development

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Neurodevelopmental Biology and Epigenetic Intersection

Early life experiences trigger epigenetic modifications that alter neuroendocrine levels, brain structure and brain function

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Neurodevelopmental Biology and Epigenetic Intersection

Early life experiences trigger epigenetic modifications that alter neuroendocrine levels, brain structure and function

Nature vs Nurture

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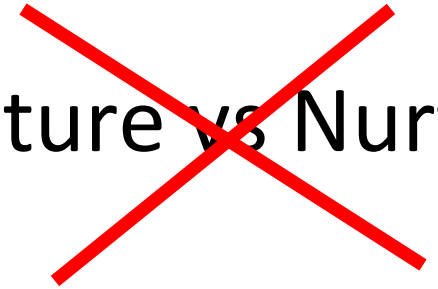
Neurodevelopmental Biology and Epigenetic Intersection

Early life experiences trigger epigenetic modifications that alter brain structure and function



Nature ***and*** Nurture Complex Intersection

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6. We can do something about it

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Identifying Infants & Young Children with Developmental Disorders in the Medical Home: Algorithm for Developmental Surveillance & Screening

Pediatrics 2006;118:405-420

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Problems in Early Identification

- **Fewer than 30% of children with developmental delays are identified before entering school**

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Problems in Early Identification

- Fewer than 30% of children with developmental delays are identified before entering school
- **While we may find children with high levels of impairment**
  - **miss many who have more subtle issues**
  - **children who may be great responders to intervention**

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Problems in Early Identification

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- **Use of checklists of developmental skills, do not provide standardized cut-offs that indicate a need for referral**

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Problems in Early Identification

- Fewer than 30% of children with developmental delays are identified before entering school
- While we may find children with high levels of impairment
  - miss many who have more subtle issues
  - children who may be great responders to intervention
- Use of checklists of developmental skills, do not provide standardized cut-offs that indicate a need for referral
- **Validated tools provide standardized data to guide practice and assure uniform care for all patients**

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Identifying Infants & Young Children with Developmental Disorders in the Medical Home: An Algorithm for Developmental Surveillance & Screening

Council on Children with Disabilities
Section on Developmental / Behavioral Pediatrics
Bright Futures Steering Committee
Medical Home Initiatives for CSHCN

Pediatrics 2006;118:405-420

Riley Children's Foundation

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Developmental Surveillance

Definition: Developmental Surveillance

"A *flexible*, *longitudinal*, *continuous*, and *cumulative* process whereby knowledgeable health care professionals identify children who may have developmental problems"

(AAP 2006)

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5 Parts to Developmental Surveillance

1. Role of parent concern
2. Use of developmental history
3. Role of observation
4. Risk and protective factor assessment
    a) Environmental
    b) Biologic
    c) Genetic
    d) Social and demographic
5. Documentation

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Developmental screening

- "The administration of a brief standardized tool aiding the identification of children at risk of a developmental disorder"
  - Brief
  - Standardized
  - Identification of risk
  - NOT DIAGNOSTIC

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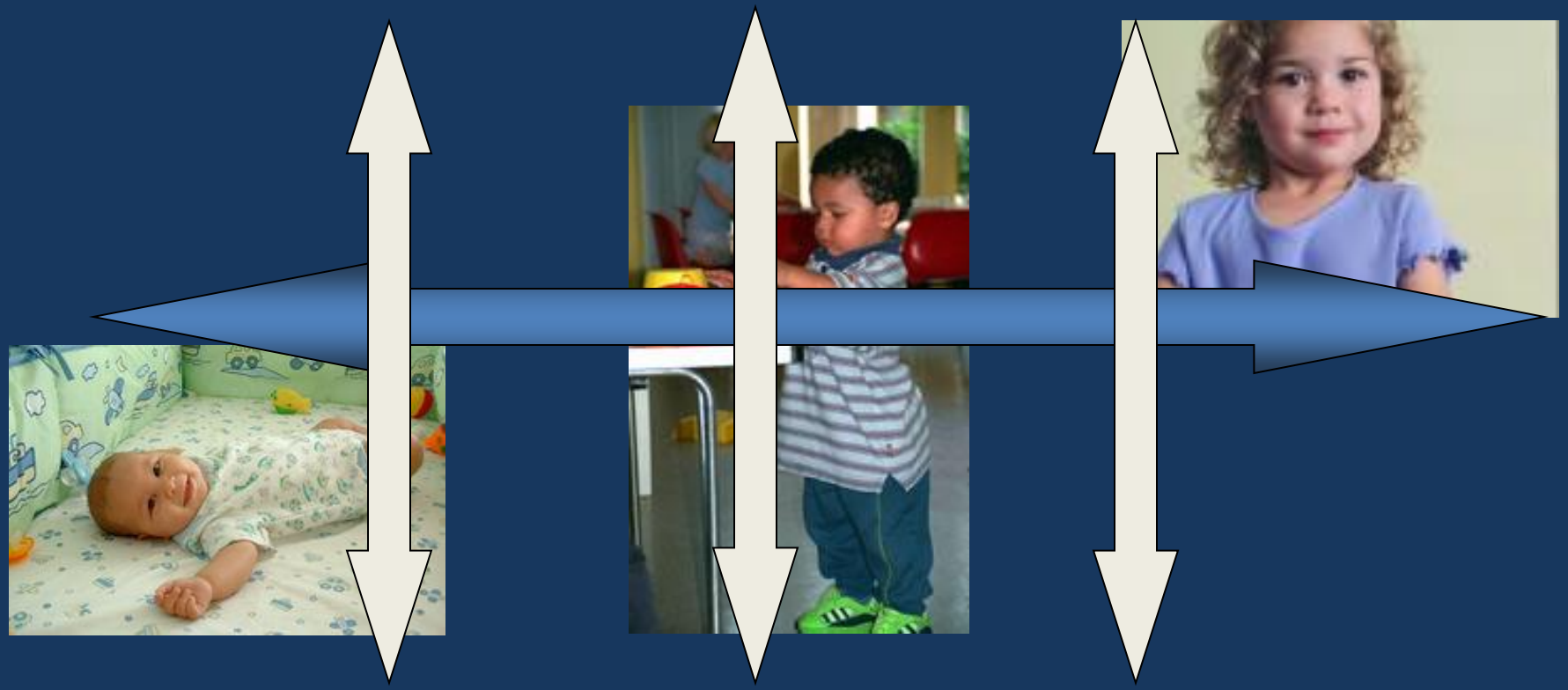
Developmental Surveillance



Developmental Screening

Developmental Screening

- **All** children, most of whom will not have identifiable risks or whose development appears normal
- In the absence of established risk factors or parental or provider concerns:
  - » **9 months**
  - »**18 months**
  - »**24 or 30 months**

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Identifying Infants And Young Children With Developmental Disorders In The Medical Home:

Algorithm For Developmental Surveillance & Screening

1. Developmental surveillance at every well-child visit

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Identifying Infants And Young Children With Developmental Disorders In The Medical Home:

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1. Developmental surveillance at every well-child visit
2. Developmental screening using a standardized screening tool at 9, 18, or 24-30 months or when concern is expressed

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2. Developmental screening using a standardized screening tool at 9, 18, or 24-30 months or when concern is expressed
3. If screening results are concerning, refer to:
   a. Medical evaluation
   b. Early intervention services

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3. If screening results are concerning, refer to:
   a. Developmental evaluation
   b. Medical evaluation
   c. Early intervention services
4. Continually track child's developmental status

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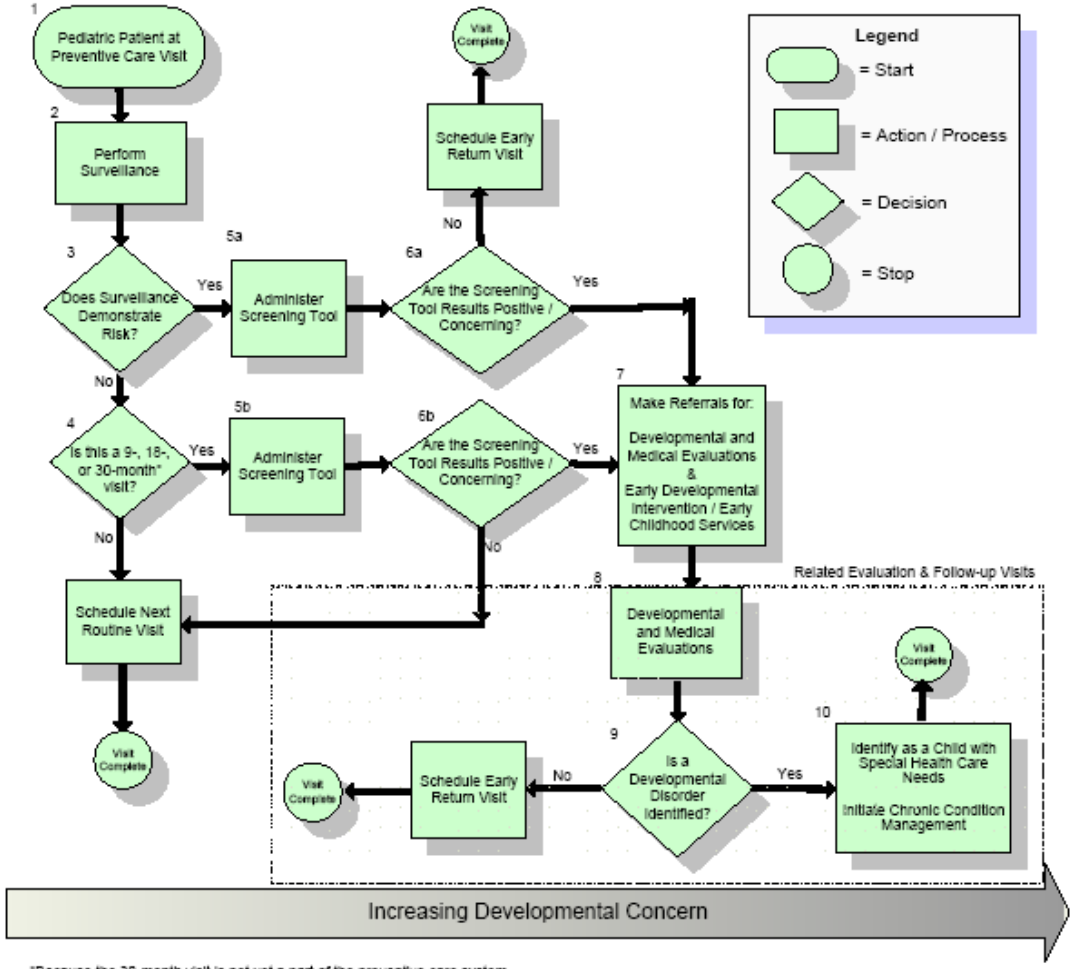
Developmental Surveillance and Screening Algorithm Within a Pediatric Preventive Care Visit



*Because the 30-month visit is not yet a part of the preventive care system and is often not reimbursable by third-party payers at this time, developmental screening can be performed at 24 months of age.

Developmental Diagnostic Evaluation

- Trained and skilled primary care physician
- Pediatric subspecialist

  Neurodevelopmental pediatricians, developmental and behavioral pediatricians, child neurologists, pediatric physiatrists, or child psychiatrists
- With early childhood professionals

  Early childhood educators, child psychologists, speech language pathologists, audiologists, social workers, physical therapists, or occupational therapists.
- Explicit co-management plans with the family, specialist(s) and primary care

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Aims of Medical Diagnostic Evaluation

- To identify an underlying etiology
- Provide greater understanding of child's condition
- Treatment planning
  - Specific prognostic information
  - Genetic counseling - recurrence risk
  - Specific medical treatments for improved health and function of the child
  - Therapeutic intervention programming

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General Developmental Screening Tools

- Ages and Stages Questionnaire
- Parents' Evaluation of Developmental Status (PEDS)
- Battelle Developmental Inventory (BDI) Screening Test
- Bayley Infant Neurodevelopmental Screener (BINS)
- Brigance Screens-II
- Infant Development Inventory
- Child Development Review
- Child Development Inventory (CDI)
- Denver-II Developmental Screening Test

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Autism Screening

- Modified Checklist for Autism in Toddlers (M-CHAT)
- Autism Behavior Checklist (ABC)
- Checklist for Autism in Toddlers (CHAT)
- Modified Checklist for Autism in Toddlers-23 (CHAT-23)
- Pervasive Developmental Disorders Screening Test-II (PDDST-II) - Stage 1-Primary Care Screener
- Pervasive Developmental Disorders Screening Test-II (PDDST-II) - Stage 2-Developmental Clinic Screener
- Screening Tool for Autism in Two-Year-Olds (STAT)
- Social Communication Questionnaire (SCQ) (formerly Autism Screening Questionnaire-ASQ)

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Critical Points

4. Early experiences can change brain development
5. Importance of developmental screening
6. We can do something about it

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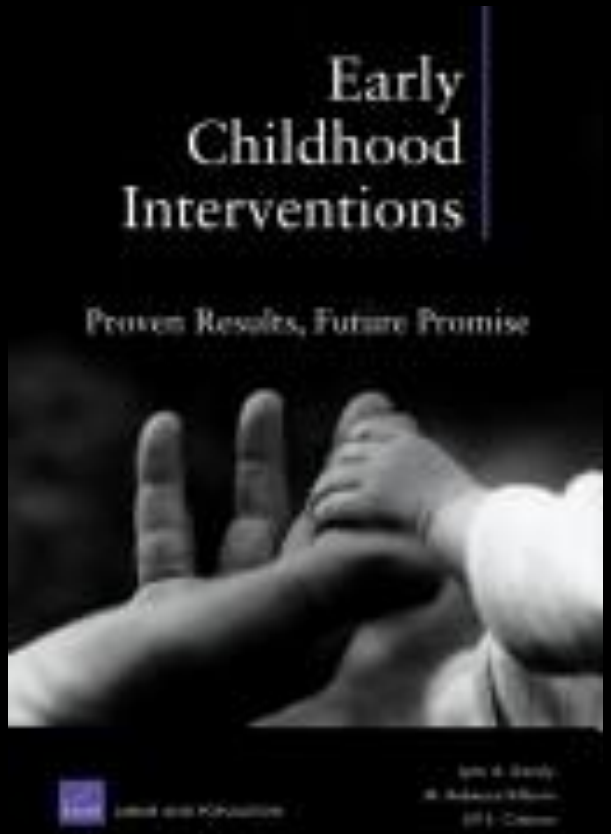
Rand Study
Key Findings of Early Intervention Programs



Early Childhood Interventions Proven Results, Future Promise; Lynn A. Karoly M. Rebecca Kilburn, Jill S. Cannon. Prepared for Labor and Population, 2005
http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG341.pdf

Rand Study
Types of Intervention Programs

a. Parent education and family supports through home visiting or services provided in other settings
b. Early childhood education, typically in a center-based setting, for one or two years prior to school access
c. Combines the two approaches

Early Childhood Interventions Proven Results, Future Promise; Lynn A. Karoly M. Rebecca Kilburn, Jill S. Cannon. Prepared for Labor and Population, 2005
http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG341.pdf

Rand Study
Key Findings of Early Intervention Programs

1. Are high quality early intervention programs effective?
2. What are the attributes of high quality programs?
3. What is the return on investment (ROI)?

Early Childhood Interventions Proven Results, Future Promise; Lynn A. Karoly M. Rebecca Kilburn, Jill S. Cannon. Prepared for Labor and Population, 2005
http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG341.pdf

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Early Treatment Effective Infant Health and Development Program

- 8 site randomized controlled trial of comprehensive early intervention
  - low birthweight, premature infants
  - first 3 years of life
  - three intervention modalities
    - home visits
    - child centers
    - parent meetings

Blair, C. Ramey, C , Hardin, J; *Early intervention for low birthweight, premature infants: participation and intellectual development.* Journal of Mental Retardation. 1995; 99(5):542-54

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Early Treatment Effective
Infant Health and Development Program

- ***Intellectual development at 24 and 36 mos***
  - associated with each of the three intervention modalities
  - not associated with children's background characteristics (i.e., maternal education, birth weight)
  - findings represent a dose-response relation between intervention and outcome

Blair, C. Ramey, C , Hardin, J; *Early intervention for low birthweight, premature infants: participation and intellectual development.* Journal of Mental Retardation. 1995; 99(5):542-54

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Home Visiting or Parent Education
DARE to be You
Developmentally Supportive Care: Newborn Individualized Developmental Care and Assessment Program*
HIPPY (Home Instruction Program for Preschool Youngsters) USA
Incredible Years
Nurse-Family Partnership Program
Parents as Teachers*
Project CARE (Carolina Approach to Responsive Education)—without early childhood education
Reach Out and Read*
Home Visiting or Parent Education Combined with Early Childhood Education
Carolina Abecedarian Project
Chicago Child-Parent Centers
Early Head Start*
Early Training Project
Head Start
High/Scope Perry Preschool Project
Houston Parent-Child Development Center
Infant Health and Development Program
Project CARE—with early childhood education
Syracuse Family Development Research Program

Rand Study
Key Findings of Early Intervention Programs

Studies going back 30 years

have shown that intervention

in the first 3 years

can improve outcomes

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Rand Study

Key Findings of Early Intervention Programs

- academic achievement
- behavior
- educational progression and attainment
- delinquency and crime
- labor market success

Early Childhood Interventions Proven Results, Future Promise; Lynn A. Karoly M. Rebecca Kilburn, Jill S. Cannon. Prepared for Labor and Population, 2005
http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG341.pdf

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Rand Study
Key Findings of Early Intervention Programs

- Interventions with more favorable results
  - Better-trained caregivers
  - Smaller child-to-staff ratios
  - Parental involvement

Early Childhood Interventions Proven Results, Future Promise; Lynn A. Karoly M. Rebecca Kilburn, Jill S. Cannon. Prepared for Labor and Population, 2005 http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG341.pdf

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Rand Study
Key Findings of Early Intervention Programs

Well-designed early childhood interventions have been found to generate a return to society ranging from $1.80 to $17.07 for each dollar spent on the program

Early Childhood Interventions Proven Results, Future Promise; Lynn A. Karoly M. Rebecca Kilburn, Jill S. Cannon. Prepared for Labor and Population, 2005
http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG341.pdf

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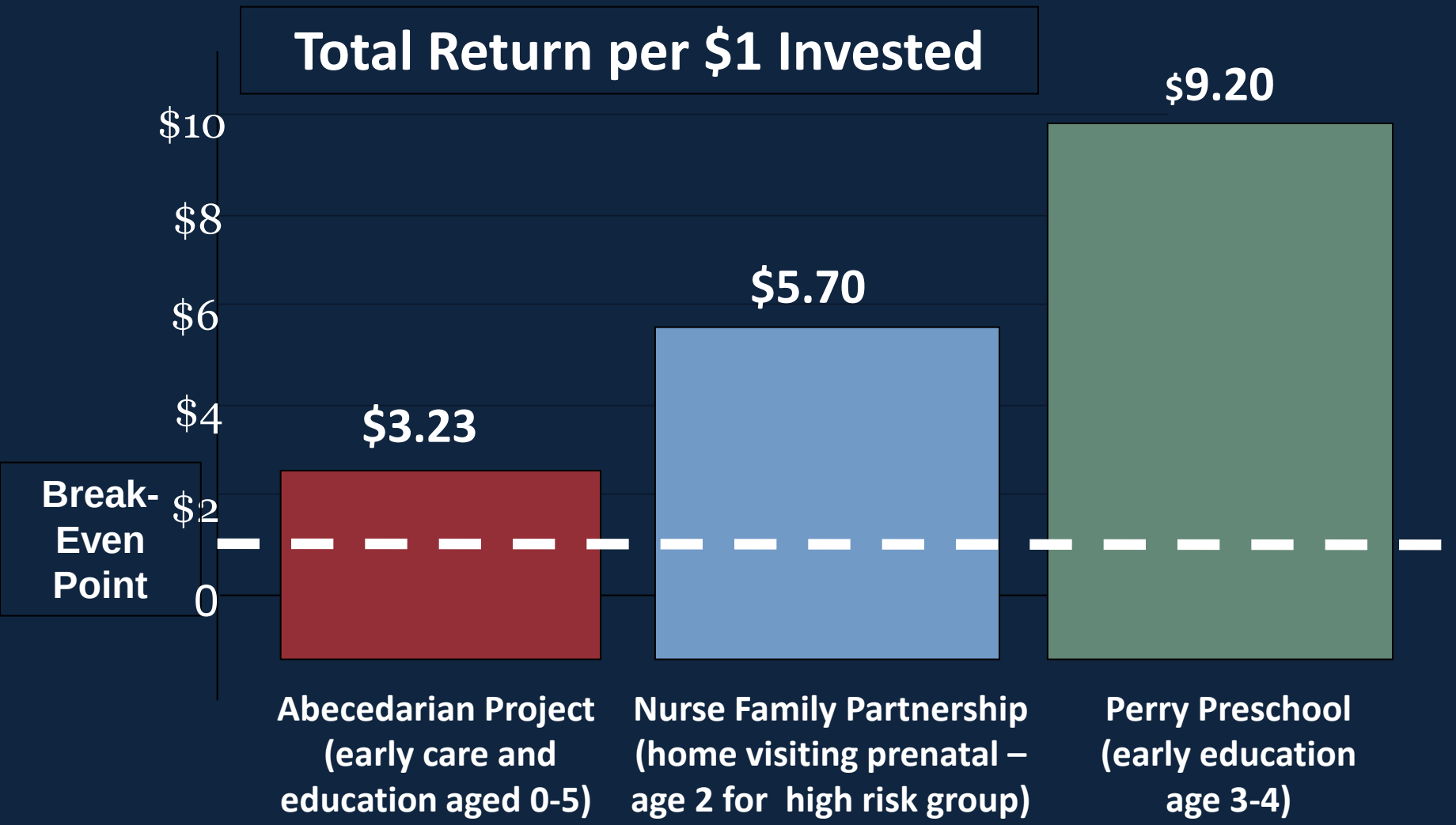
ROI for Proven Early Childhood Strategies



Center on the Developing Child at Harvard University, Karoly et al. 2005, Heckman et al. 2009


Welcome to
Indiana
Crossroads of America

“That it will ever come into general use, notwithstanding its value, is extremely doubtful because its beneficial application requires much time and gives a good bit of trouble, both to the patient and to the practitioner because its hue and character are foreign and opposed to all our habits and associations.”

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The Stethoscope

"That it will ever come into general use, notwithstanding its value, is extremely doubtful because its beneficial application requires much time and gives a good bit of trouble, both to the patient and to the practitioner because its hue and character are foreign and opposed to all our habits and associations."

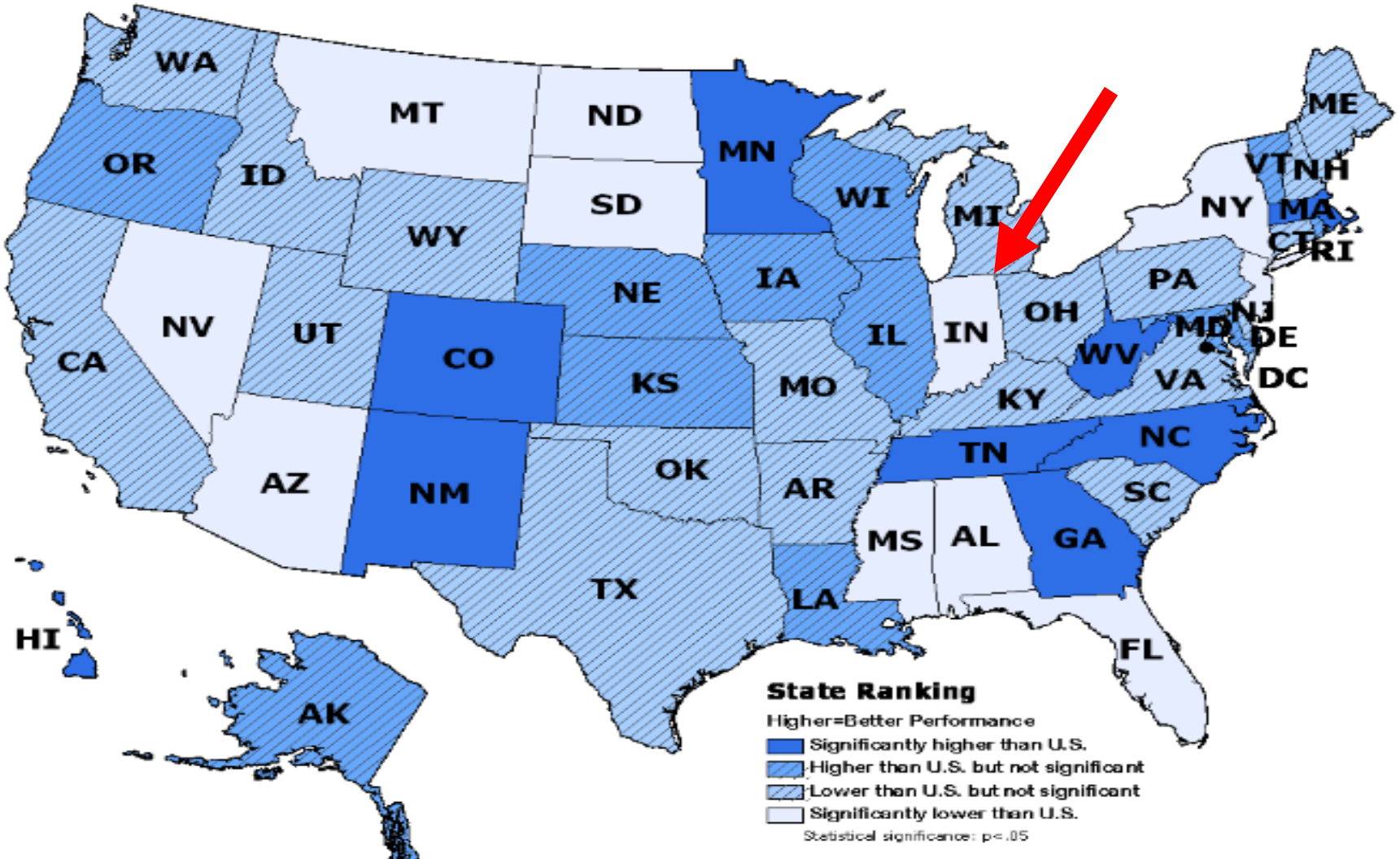
London Times, 1834

Developmental Screening
Percent of children receiving a standardized screening for developmental or behavioral problems (age 10 months-5 years)

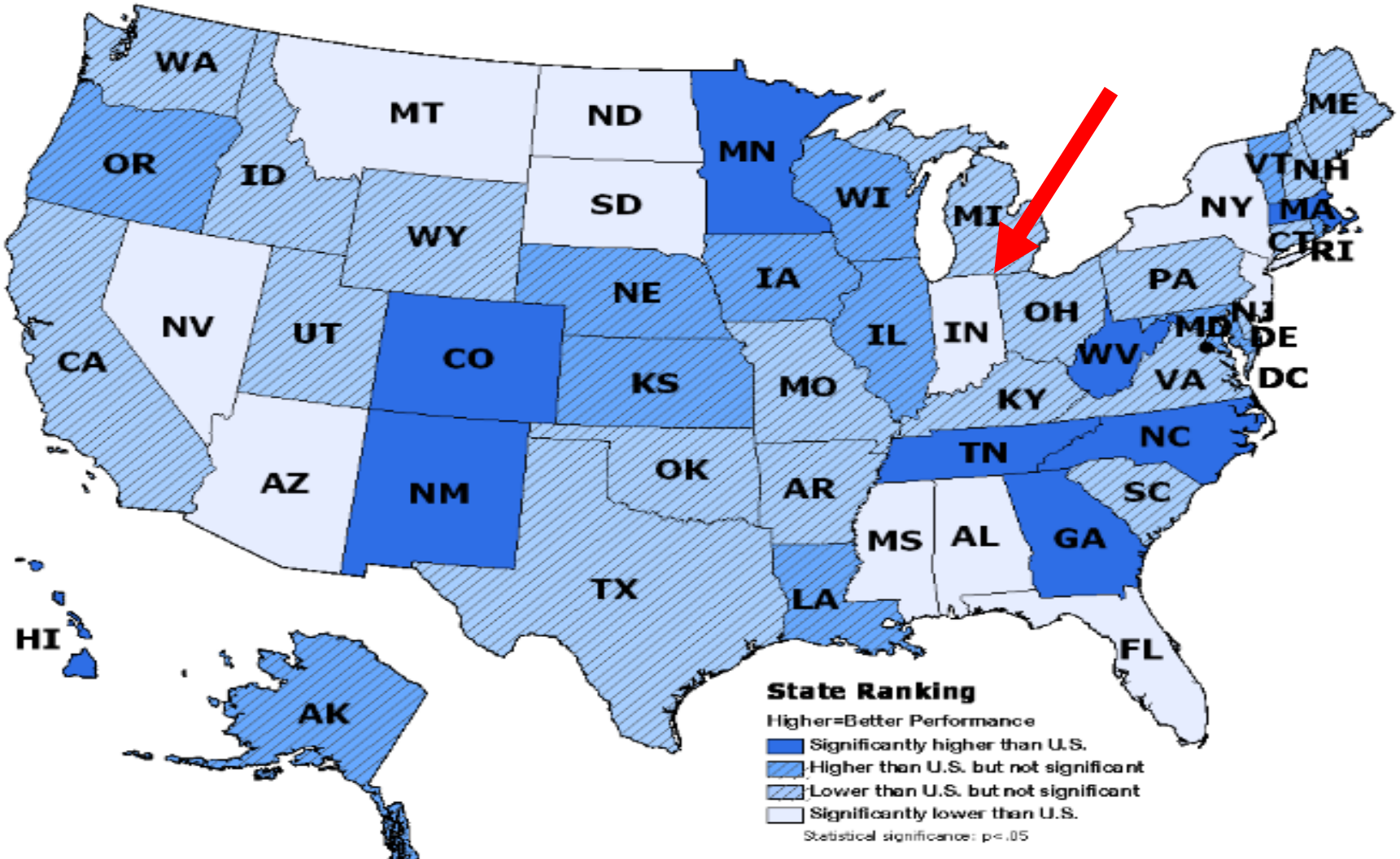
2011/12 National Survey of Children's Health

Nationwide: 30.8% of children met indicator

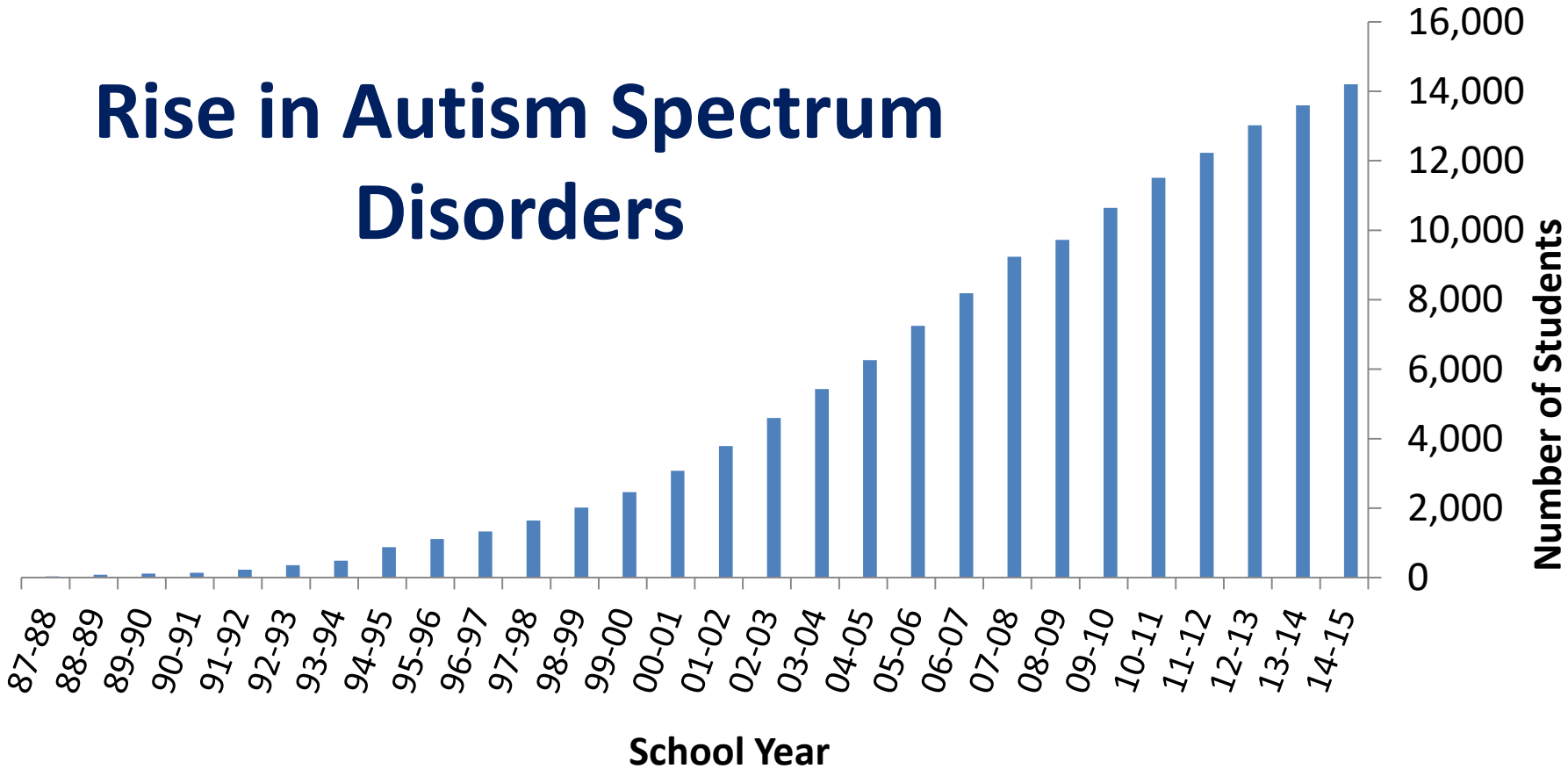
Range Across States: 17.5% to 58.0%



- More children in Indiana have developmental delay than nationally - IN 4.9% vs. US 3.6%
- Fewer children ages 10 mos - 5 yrs receive developmental screening IN 24% vs. US 31%



Students Identified with Autism Spectrum Disorder in Indiana's Public Schools



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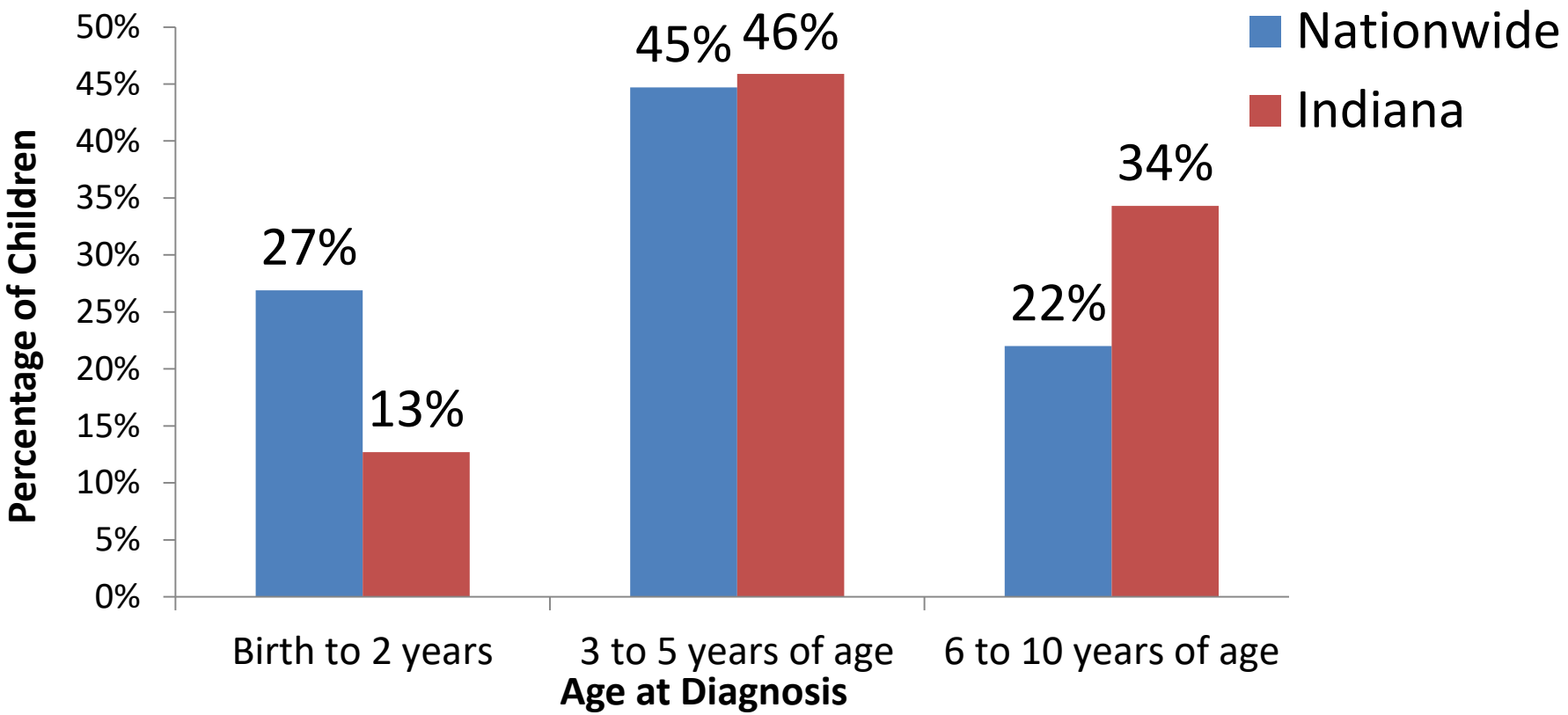
Portion of Children Diagnosed with ASD by Age Group



Source: NS-CSHCN 2009/10. Data query from the Child and Adolescent Health Measurement Initiative, Data Resource Center for Child and Adolescent Health www.childhealthdata.org.

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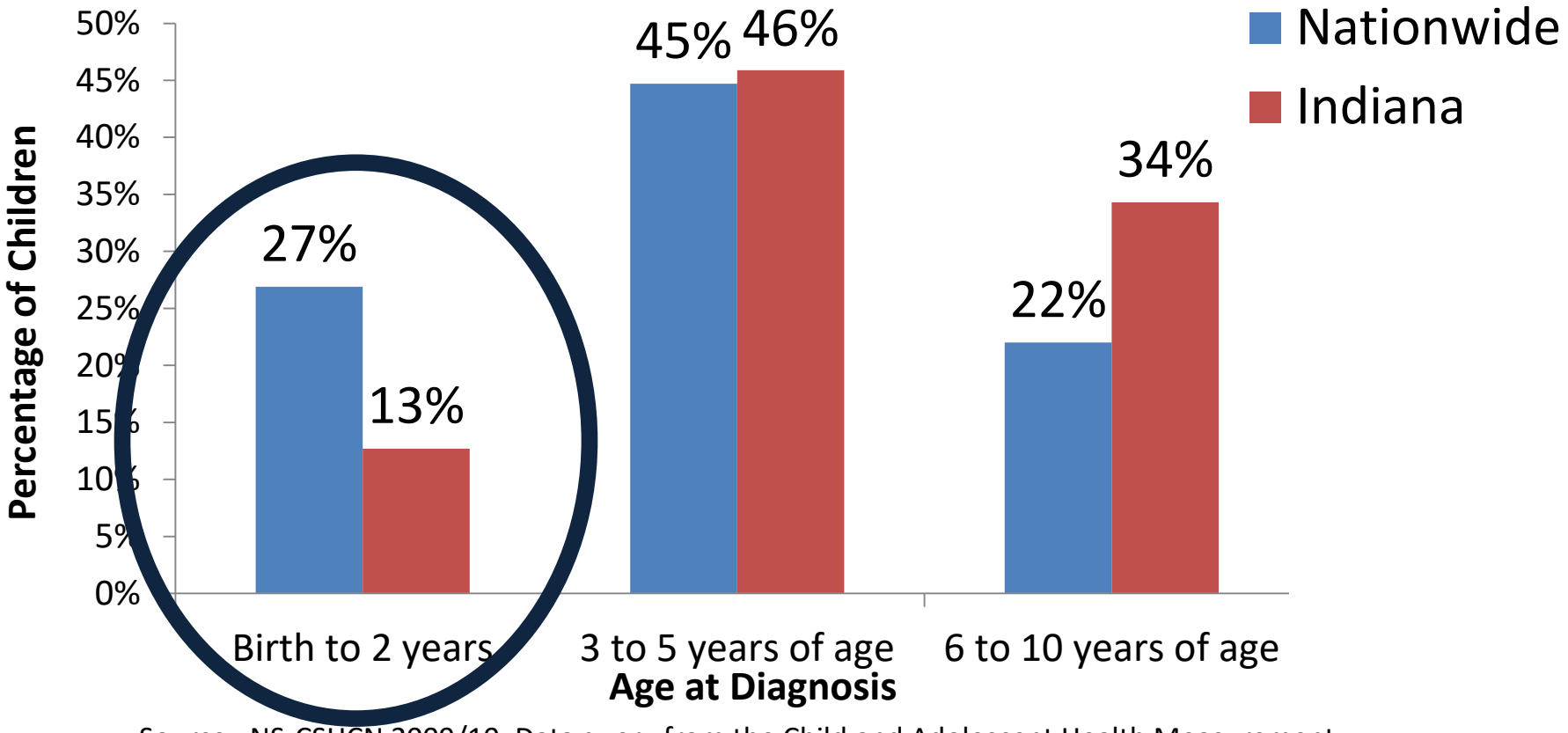
Average age of diagnosis in Indiana = 63 months



Source: NS-CSHCN 2009/10. Data query from the Child and Adolescent Health Measurement Initiative, Data Resource Center for Child and Adolescent Health www.childhealthdata.org.

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- Long travel times
- Long waiting lists
- Late diagnosis
- Inconsistent diagnosis
- Difficulty coordinating with community resources

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Improving early identification and diagnosis of developmental delay and autism spectrum disorders

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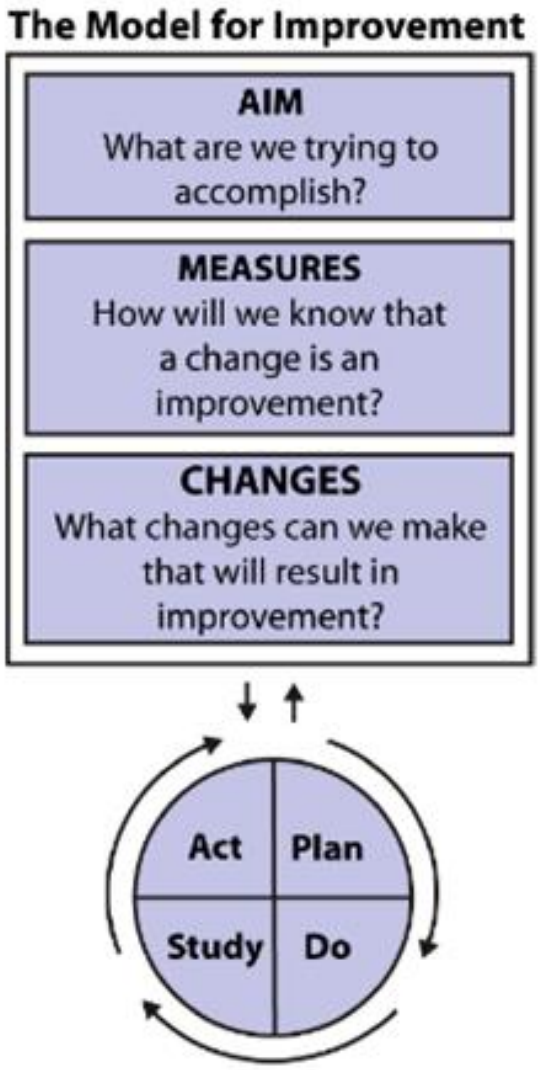
Mary Jo Paladino, MSA
Angela Paxton, BS
Mary Delaney, BA
Kara Casavan, BS
Kyle Baugh, BS
Angela Tomlin, PhD, HSPP
Cassie Karlsson, MD
Tom Lock, MD
Dorota Szczepaniak, MD
Katie Swec, MD



What are we trying to accomplish?
How will we know that a change is an improvement?

Aim

Decrease the age of diagnosis of DD/ASD from 5 years to under 3 years in Indiana over 3 years

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Implementation Science
Defining Core Elements or "Drivers"

- Community based screening (ASQ, MCHAT)
- Utilization of evidence based standardized diagnostic assessment (STAT and ADOS)
- Quality improvement and tracking of data
  - Sharing of best practices, experiences, data
- Community focus to ensure receipt of services
  - Family-centered
  - Community including schools, businesses, health care and other local entities serving children

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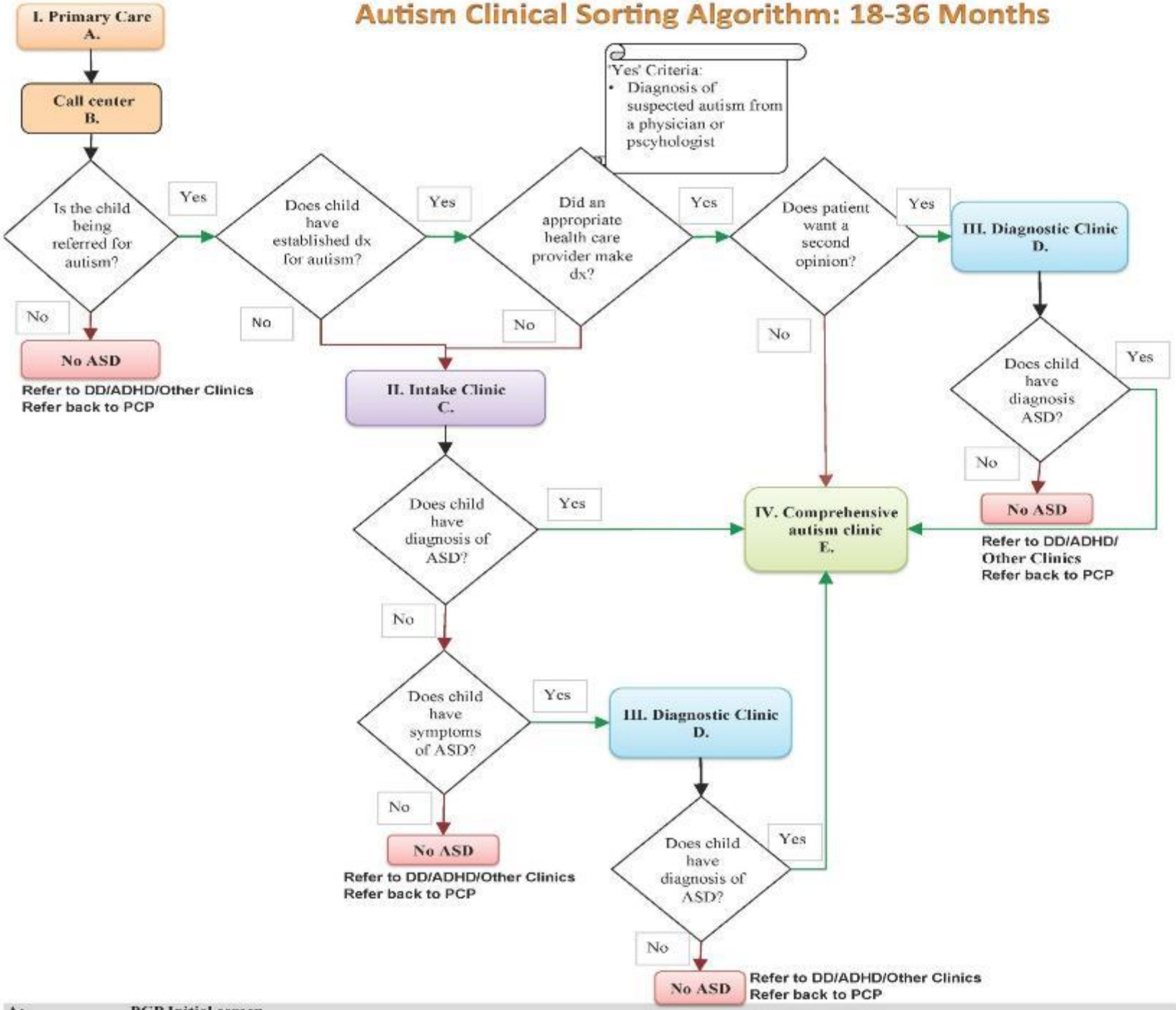
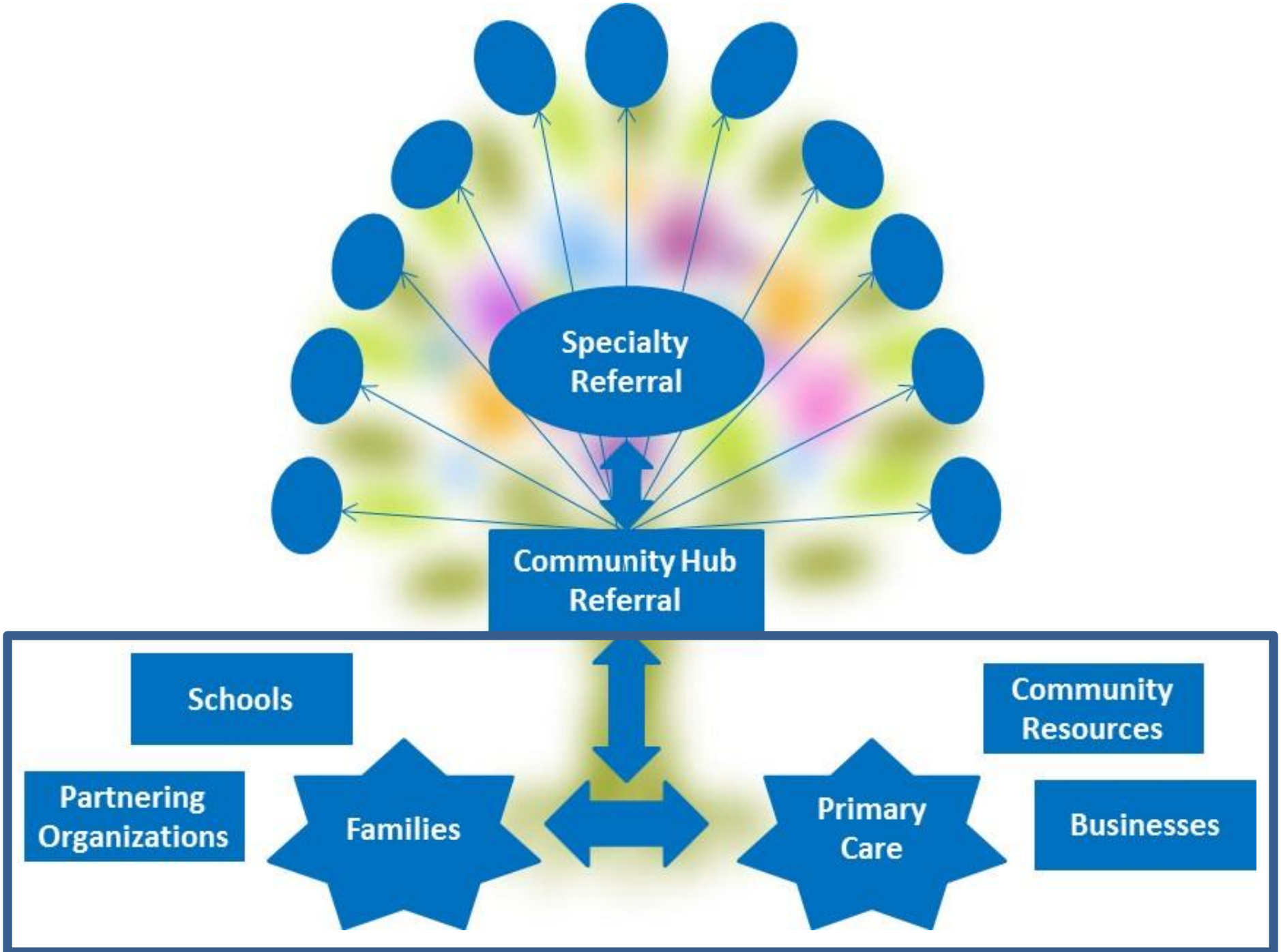
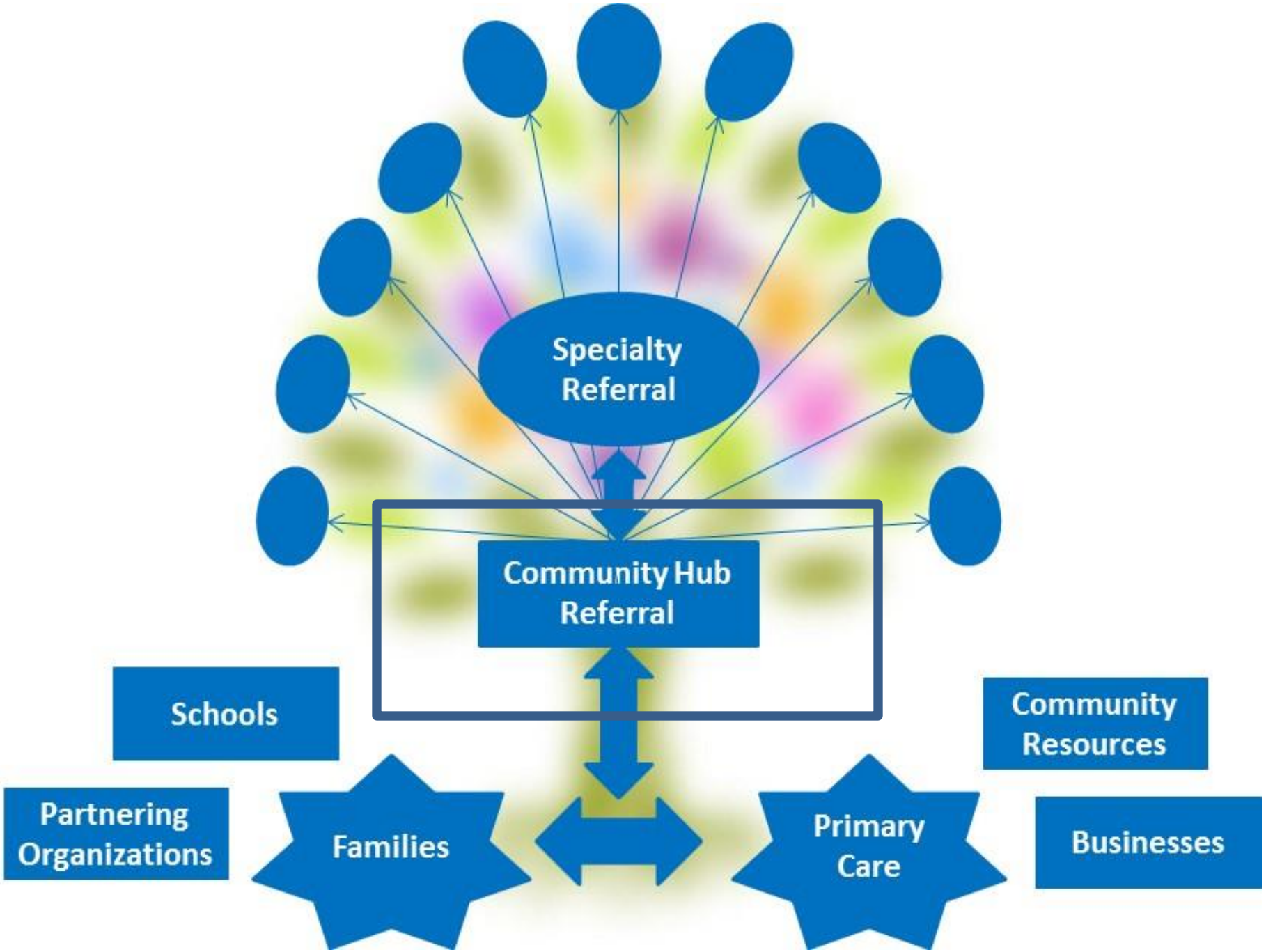
Autism Clinical Sorting Algorithm: 18-36 Months




Specialty Referral
Community Hub Referral
Schools
Community Resources
Partnering Organizations
Families
Primary Care
Businesses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Community Hub Referral
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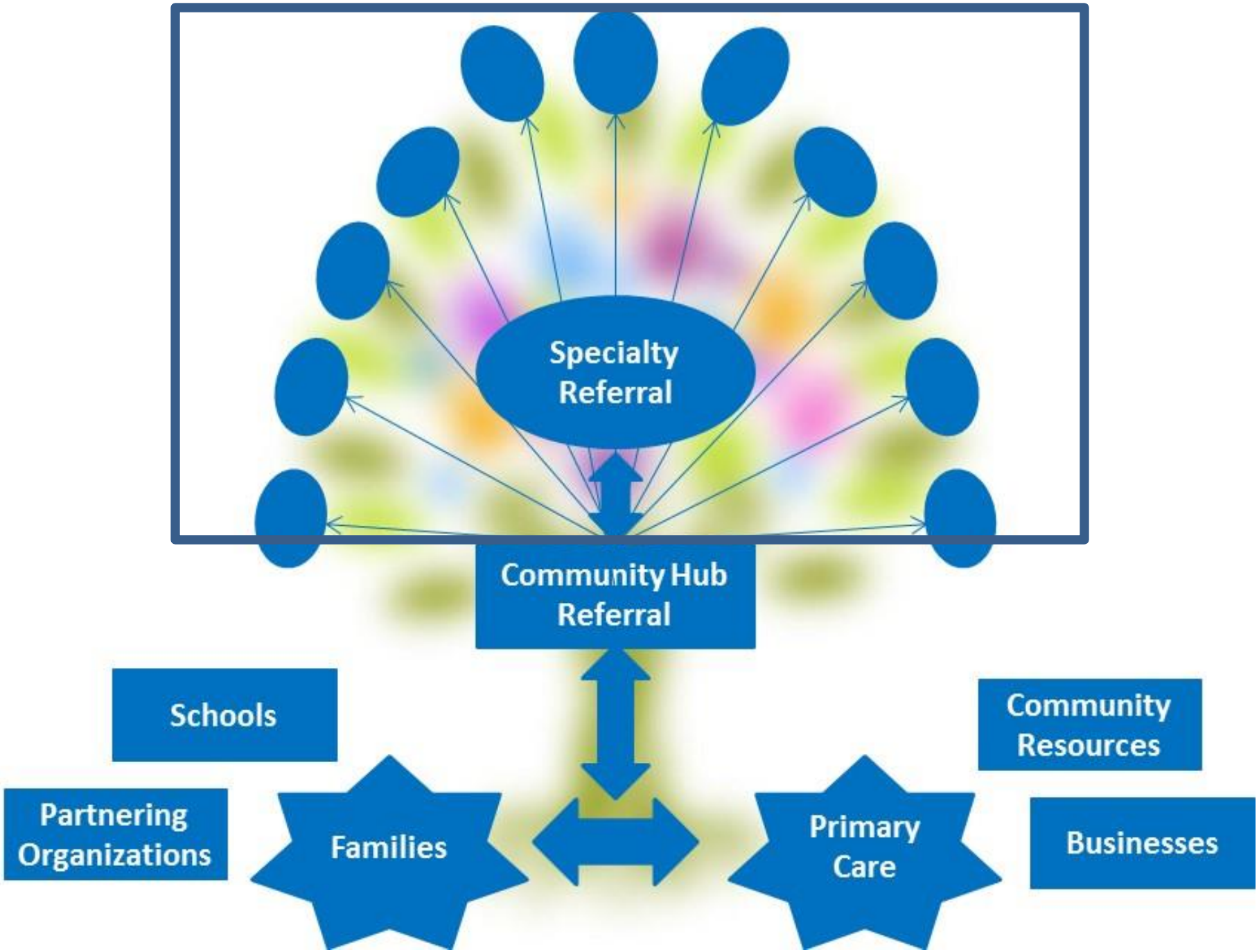
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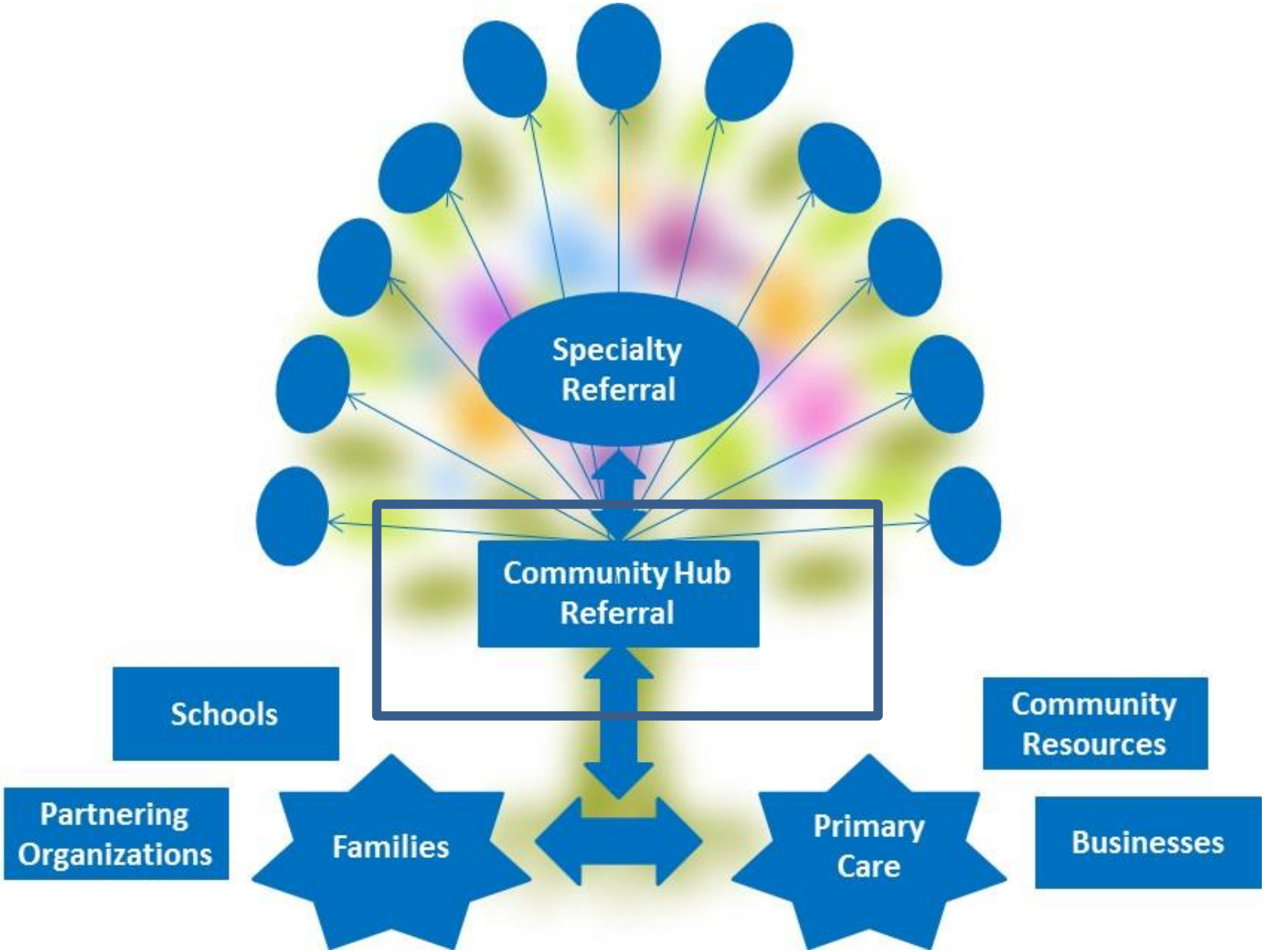
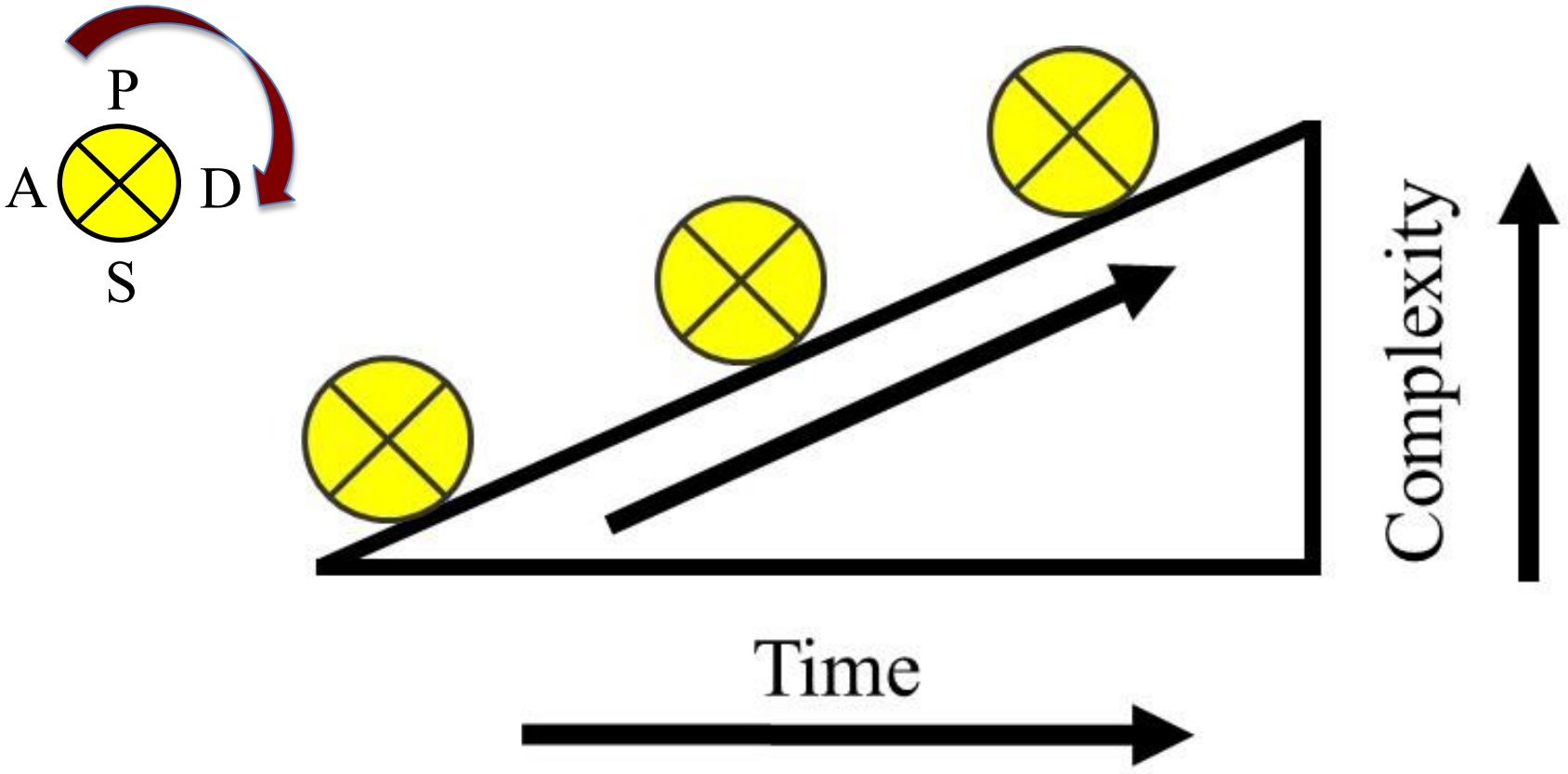

Specialty Referral
Community Hub Referral
Schools
Community Resources
Partnering Organizations
Families
Primary Care
Businesses

Plan Do, Study, & Act (PDSA)

Small incremental tests of change

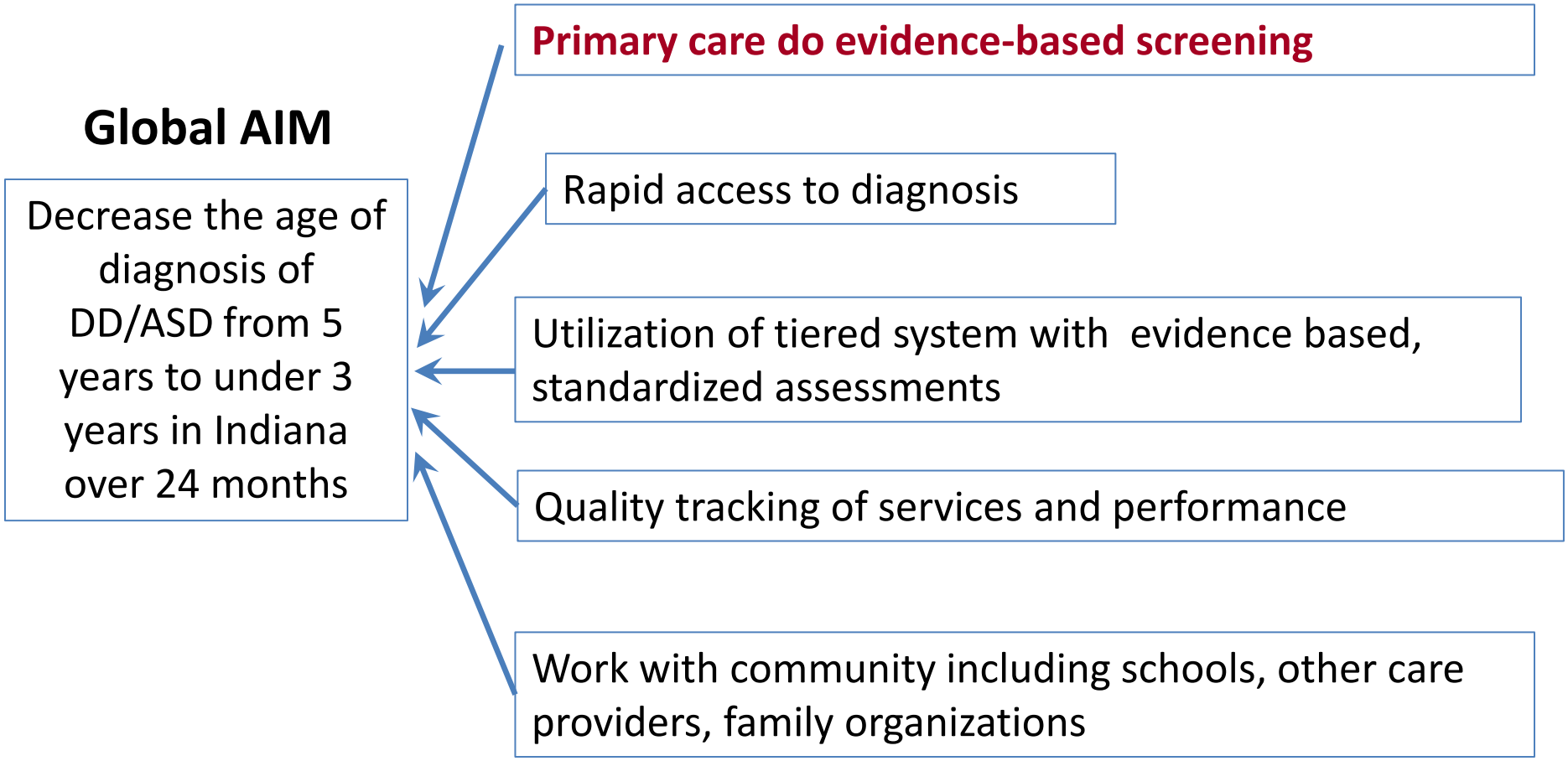


Plan, Do, Study, and Act

CMHI Center for Medical Home Improvement

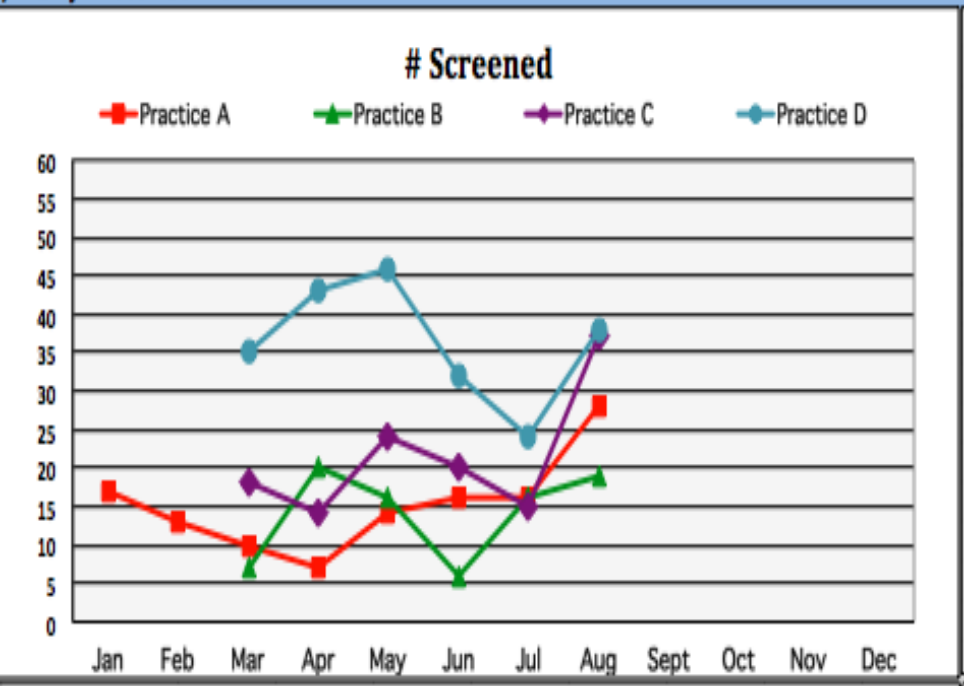
Drivers or Core Elements

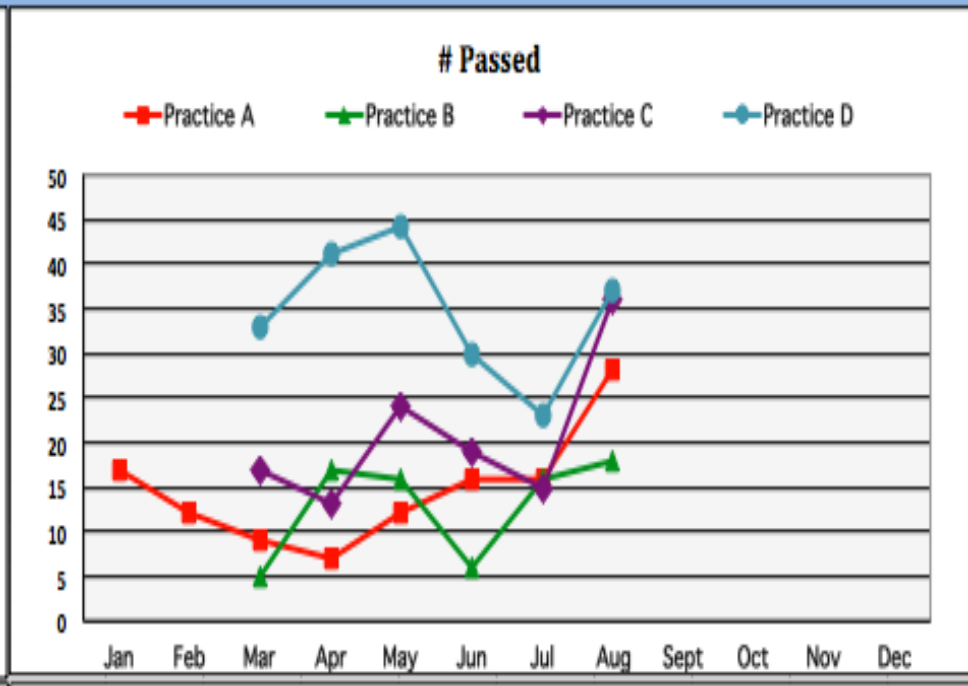
What changes can we make that will result in an improvement?

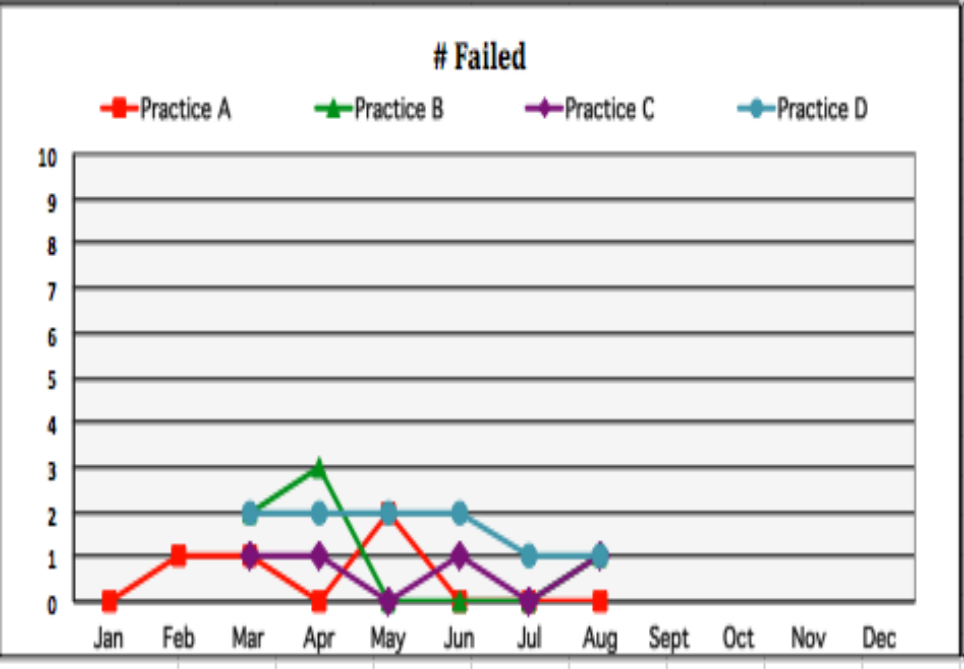


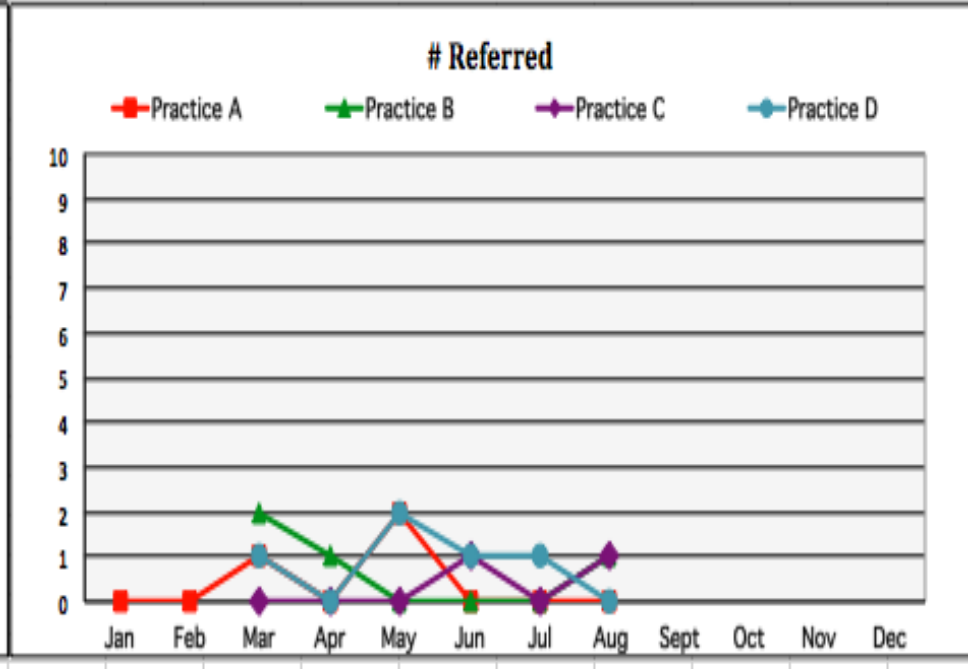
NDBC dashboard: MCHAT - 24 mon data from all 4 practices

January - December 2013

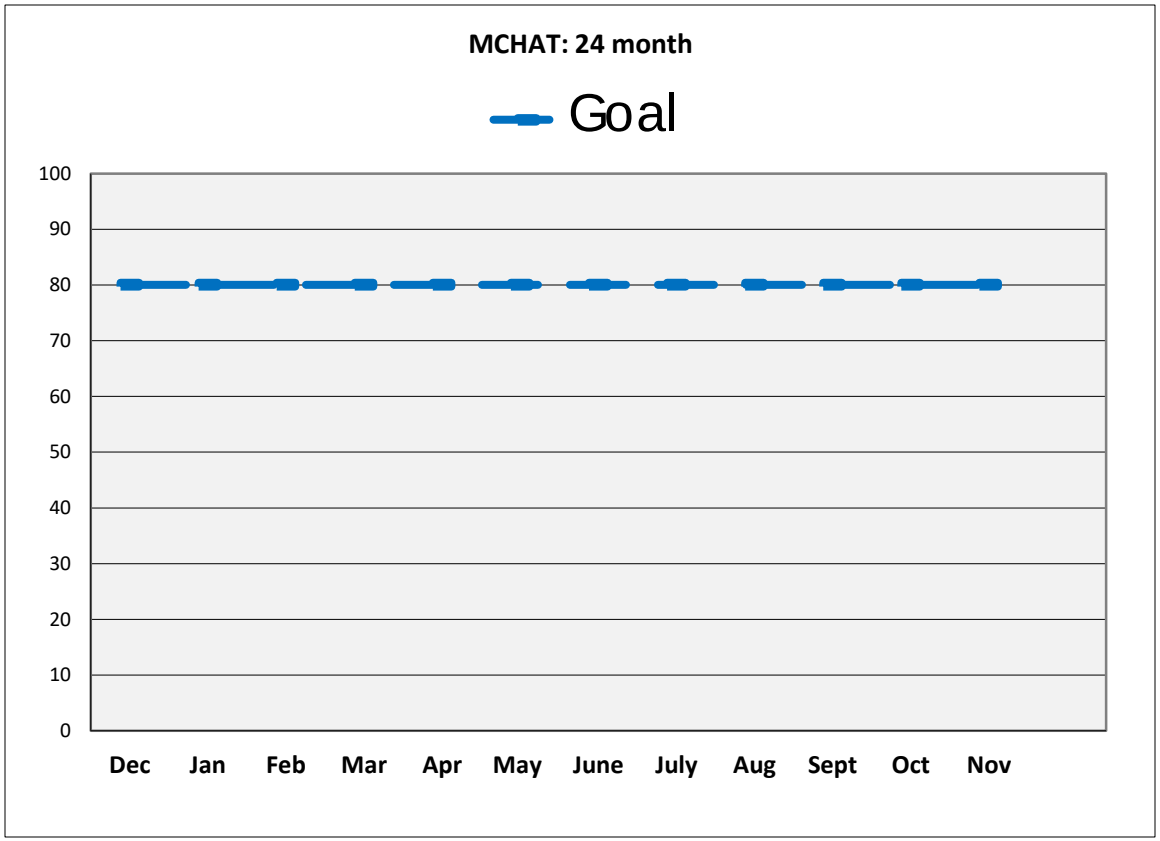








Data from Primary Care Physicians



MCHAT	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
# Screened												
# Passed												
# Failed												
# Referred												

N=462 Number of Primary Care Physicians making referrals to each Hub by # of referrals		
Hub	#PCPs who made ≤ 5 referrals	#PCPs who made > 5 referrals
A	10	0
B	4	0
C	25	14
D	21	0
E	12	1
F	36	1
G	N/A	N/A
H	37	1
Total	**145**	**17**

Drivers or Core Elements

What changes can we make that will result in an improvement?

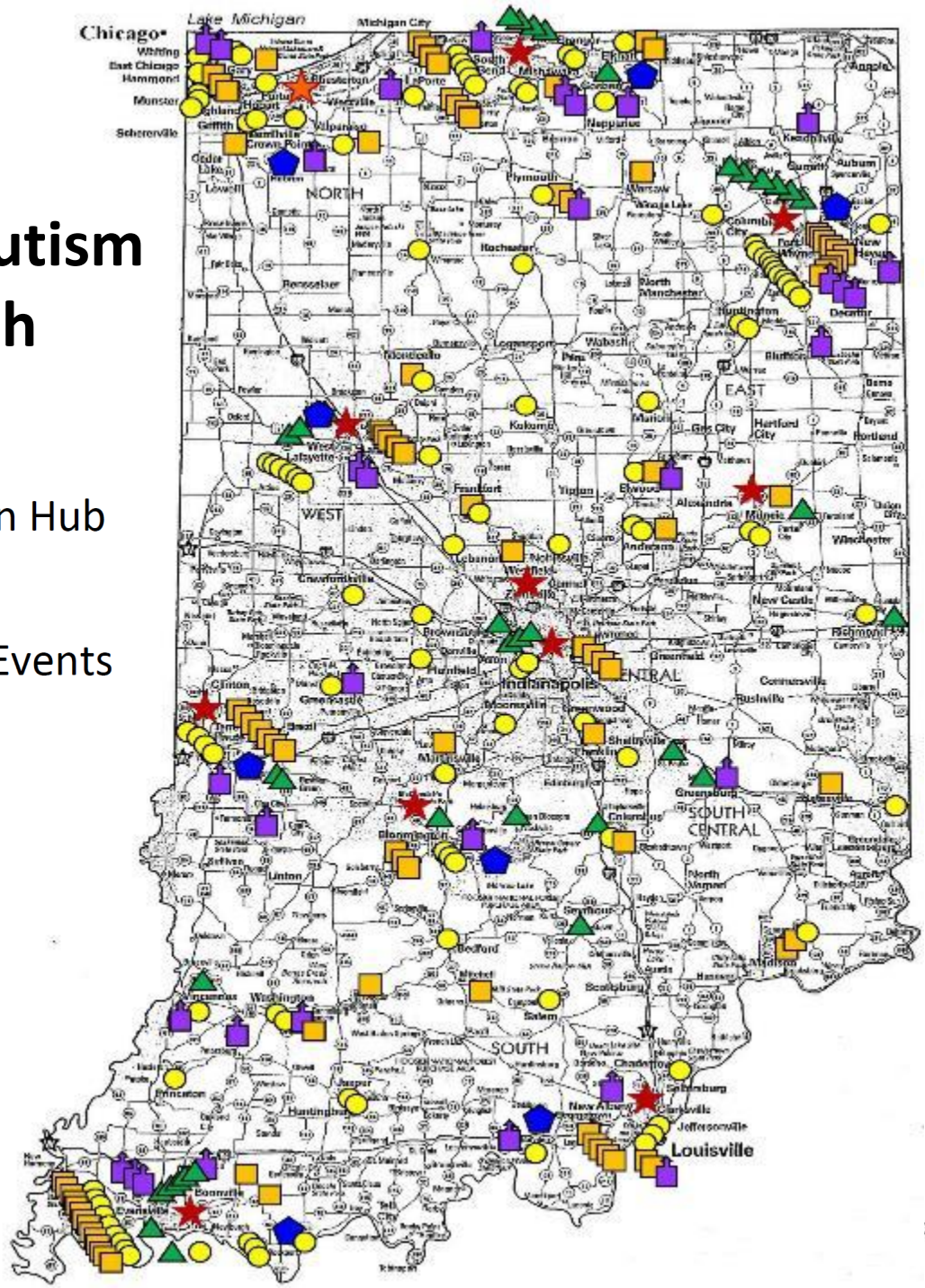
Global AIM

Decrease the age of diagnosis of DD/ASD from 5 years to under 3 years in Indiana over 24 months

- Primary care do evidence-based screening
- Rapid access to diagnosis
- Utilization of tiered system with evidence based, standardized assessments
- Quality tracking of services and performance
- **Work with community including schools, other care providers, family organizations**

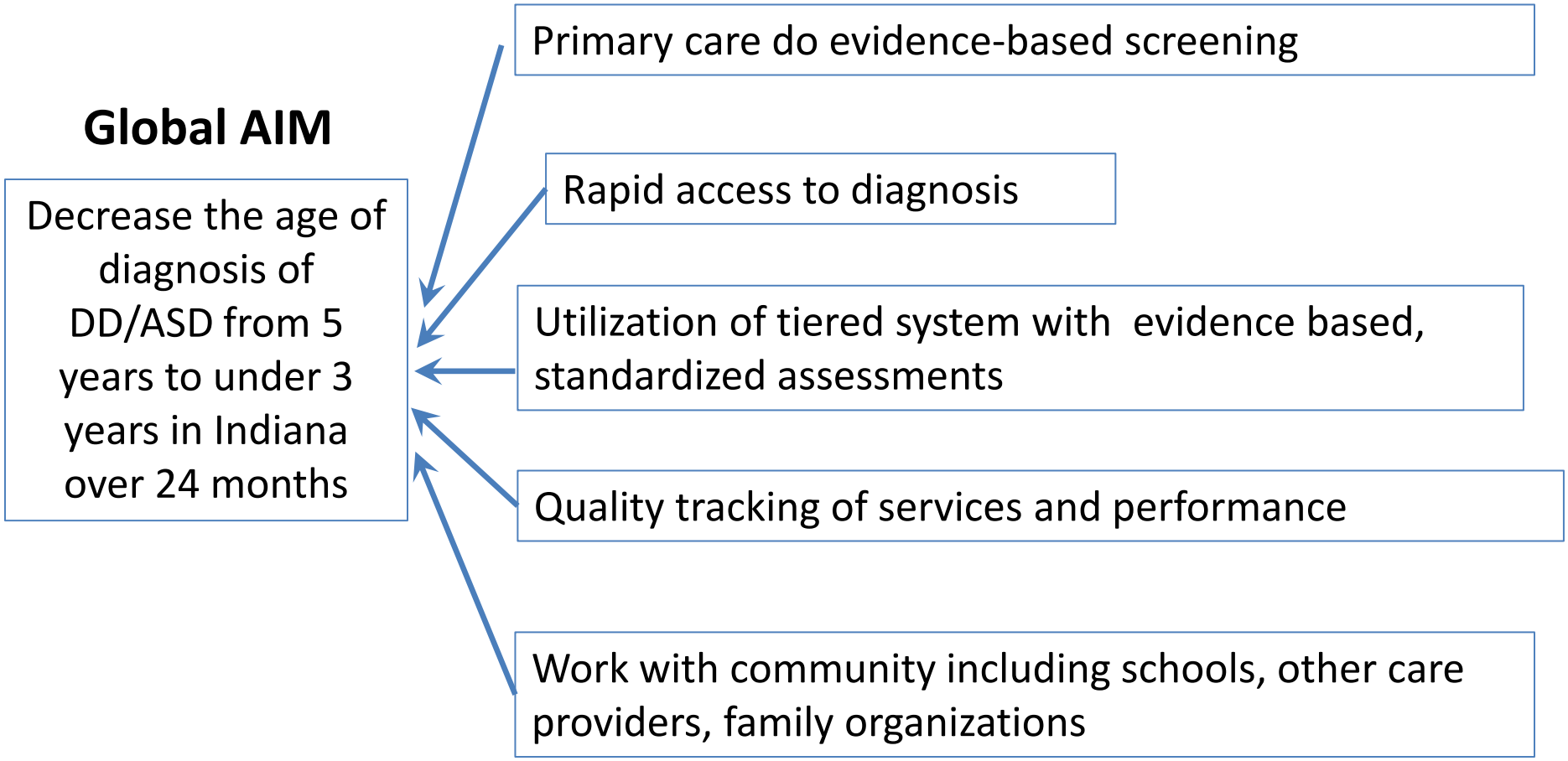
Developmental and Autism Screening Outreach

- ★ 9 Early Evaluation Hubs
- ★ 1 Future Early Evaluation Hub
- ● 108 Primary Care Visits
- ▲ 35 Grand Rounds/CME Events
- ■ 87 Community Visits
- ⬟ 32 School Visits



Drivers or Core Elements

What changes can we make that will result in an improvement?

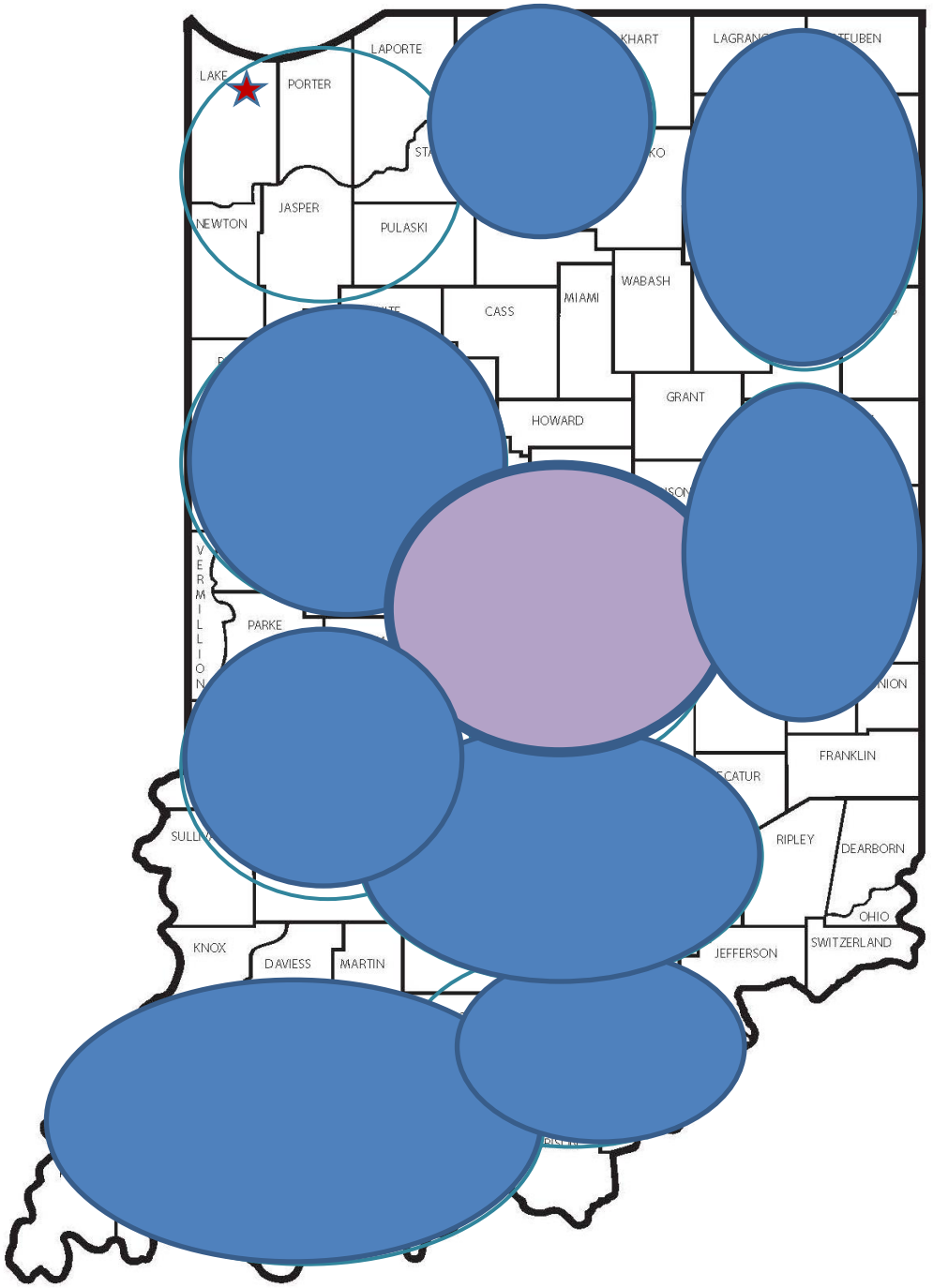


Parkview Children's Clinic
11115 Parkview Plaza Dr.
Fort Wayne, IN 46845
T 260.266.5400

Beacon Medical Group
Centennial Health Center
621 Centennial Dr., # 402
South Bend, IN 46601
T 574.647.2500

Suzanne Gresham Center
3620 W. White River Blvd
Muncie, IN 47304
T 765.741.0324

Riley Outpatient Center (ROC)
575 Riley Hospital Dr., MSA 1
Indianapolis, IN 46202
T 317.944.4846



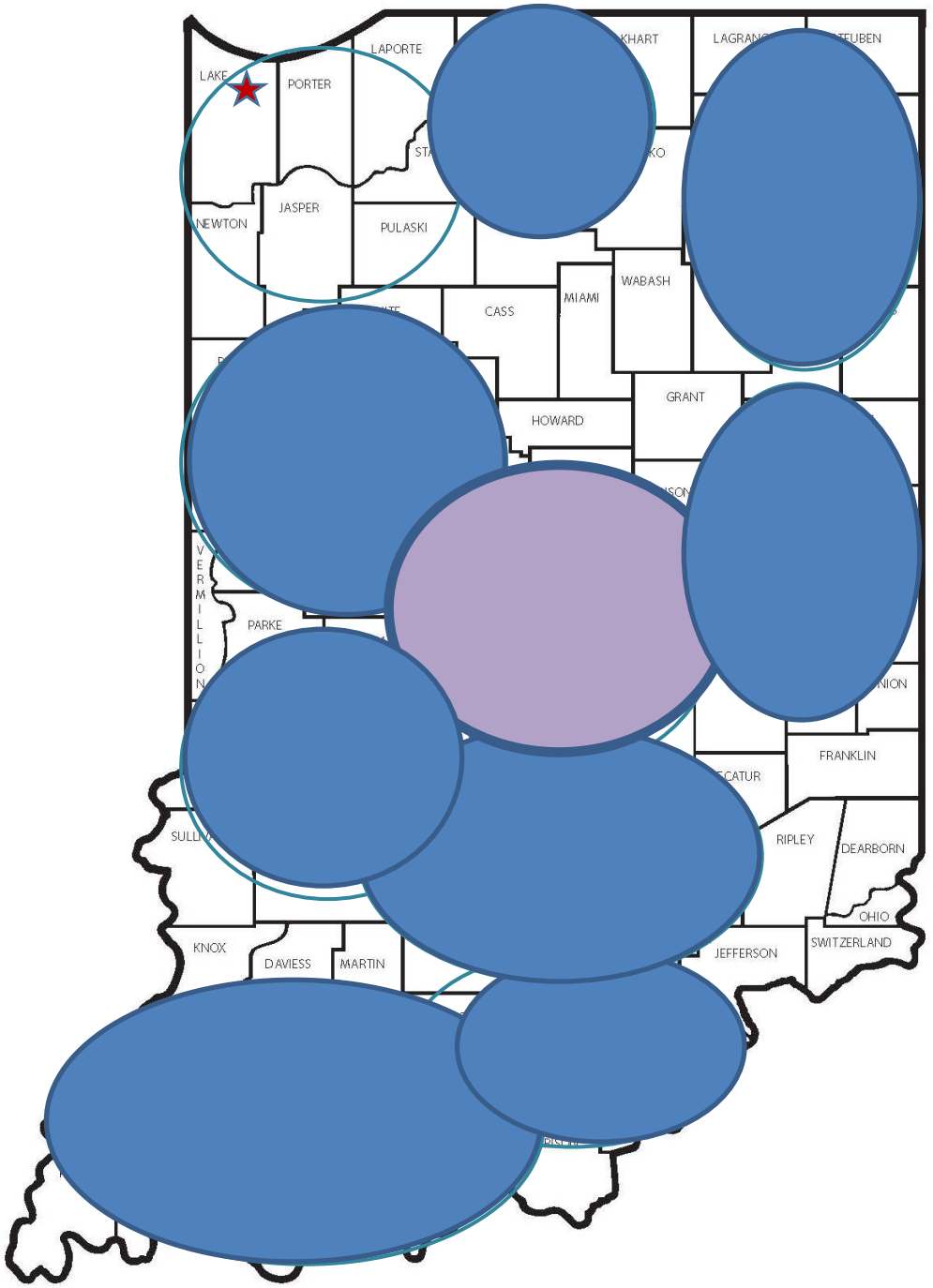
Deaconess Riley Children's Specialty Center
4133 Gateway Blvd., Suite 220
Newburgh, IN 47630 (Near Evansville)
T 812.858.3143

IU Health Riley Physicians – Bloomington
4935 W. Arlington Rd.
Bloomington, IN 47404
T 812.353.3740

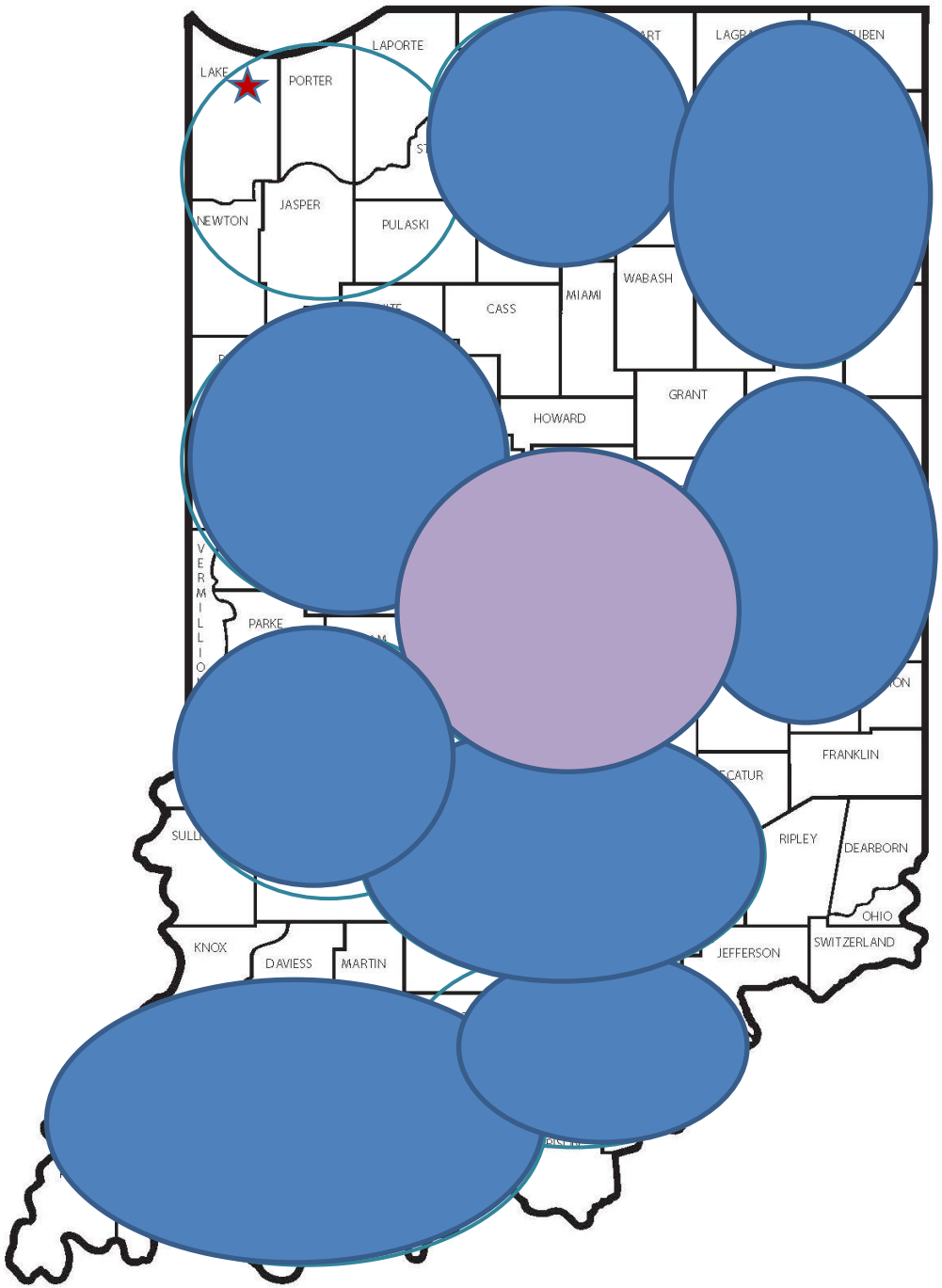
IU Health Arnett – Lafayette
2600 Greenbush
Lafayette, IN 47905
Internal health system referrals only

Nassim McMonigle & Mescia PC
2305 Green Valley Rd.
New Albany, IN 47150
T 812.949.0405

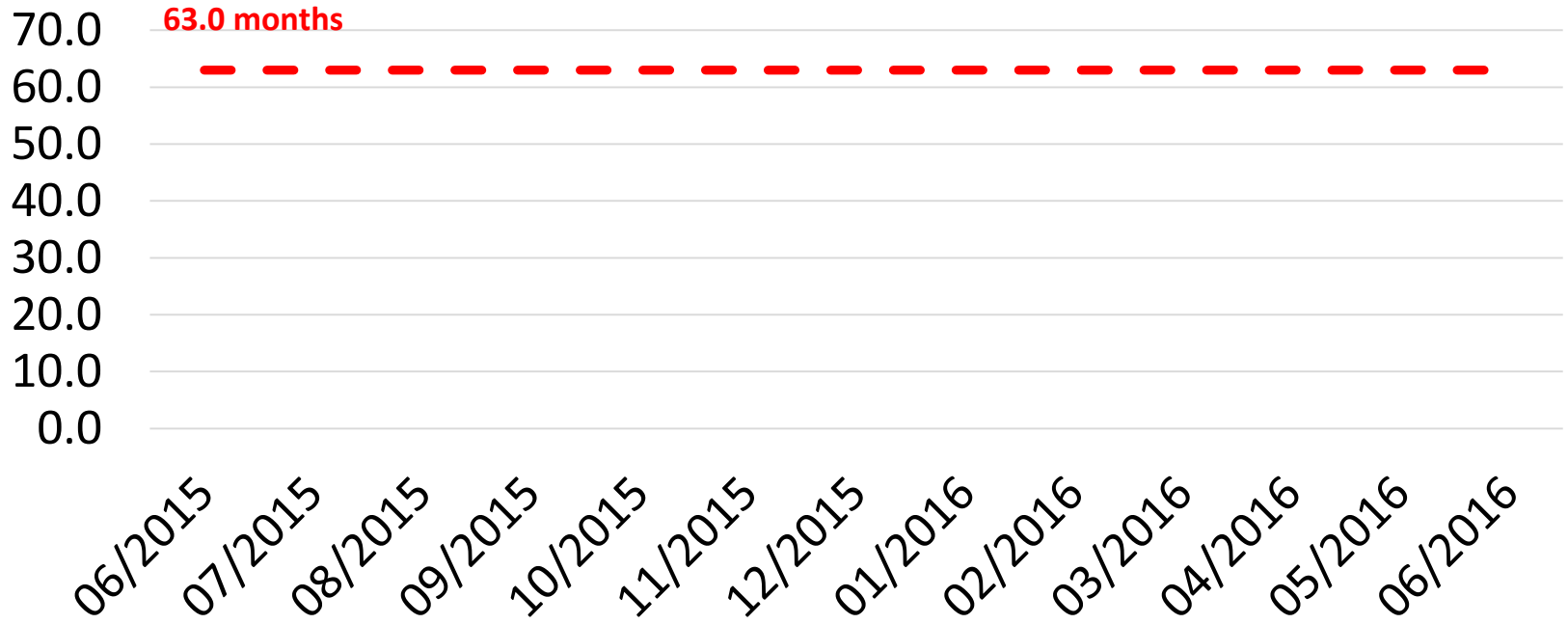
Union Associated Physicians (UAP Clinic)
221 S. Sixth St.,
Terre Haute, IN 47807
T 812.242.3105



92.7%
of 0-4 year olds
in the state



Average Age of Diagnosis in Indiana = 63.0 months



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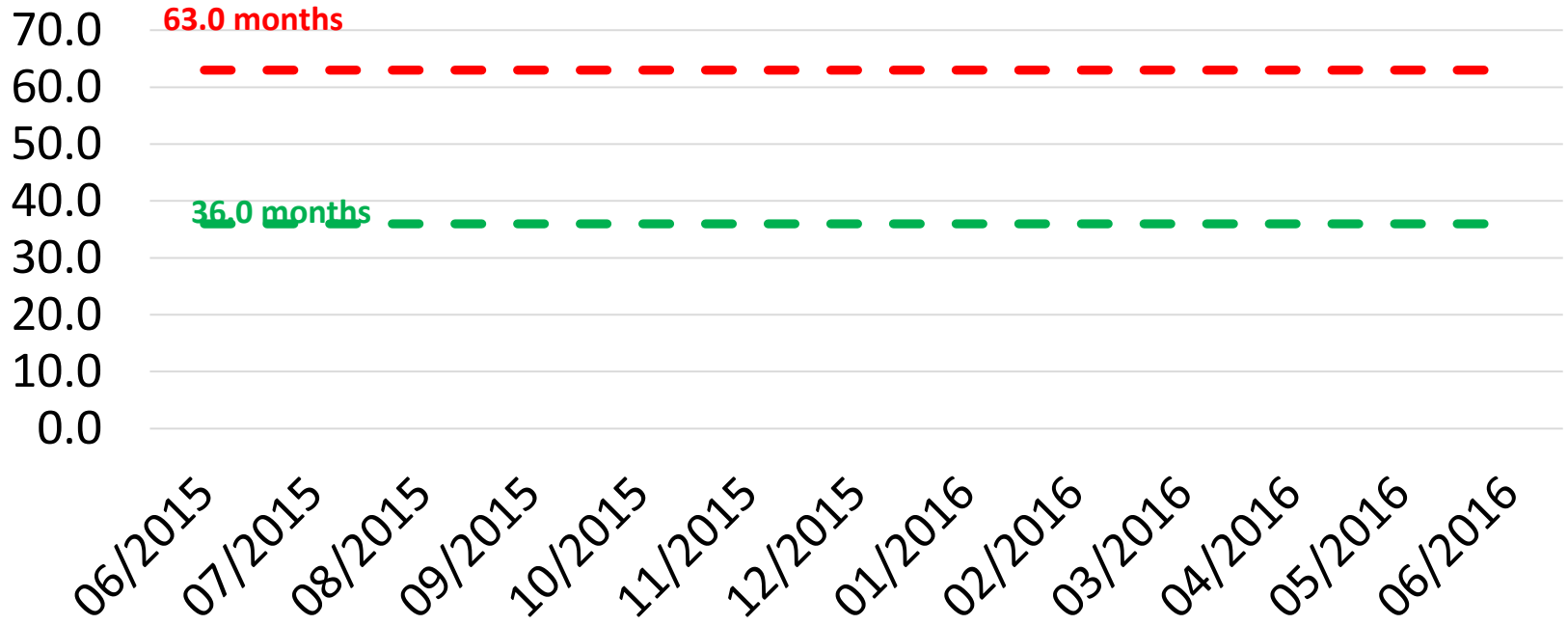
Average Age of Diagnosis in Indiana = 63.0 months

Goal = 36.0 months



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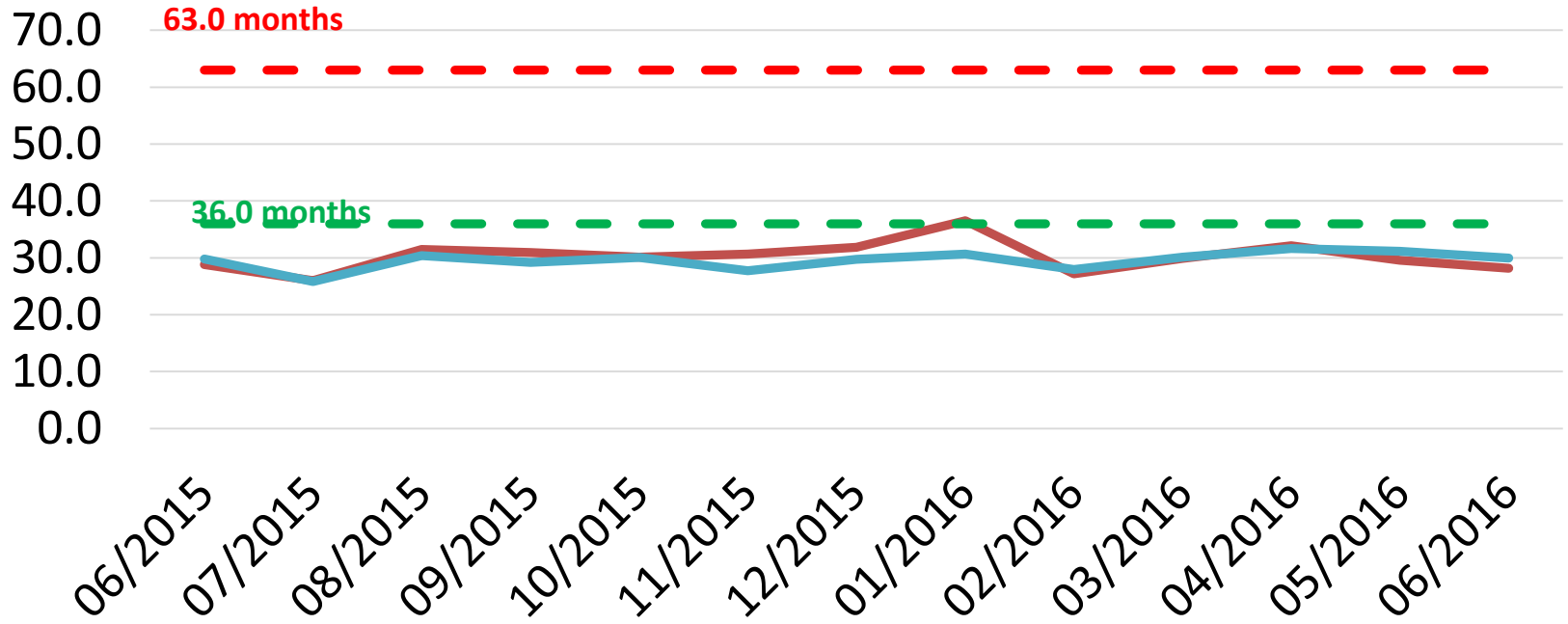
Average Age of Diagnosis in Indiana = 63.0 months

Goal = 36.0 months

Average Age of ASD Diagnosis in All Community Hubs = 30.0 months

Average Age of DD Diagnosis in All Community Hubs = 29.6 months



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Summary

- Early experiences shape the architecture of the brain
- Development of the brain incorporates experience, whether positive or negative
- Brain architecture establishes a sturdy or weak foundation for learning & behavior with life long consequences
- We can help by finding children at risk or with delays early & providing structured, evidence-based programs

Closing Thoughts

Early childhood development affects all of us!

American Academy of Pediatrics

PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Poverty and Child Health in the United States

COUNCIL ON COMMUNITY PEDIATRICS

Pediatrics; originally published online March 9, 2016;
DOI: 10.1542/peds.2016-0339

Children and Poverty

Children In Poverty (100 Percent Poverty)

Year(s): 5 selected | Data Type: All

Data Provided by: National KIDS COUNT

Location	Data Type	2010	2011	2012	2013	2014
Indiana	Number	342,000	361,000	350,000	345,000	333,000
	Percent	22%	23%	22%	22%	22%

INDICATOR CONTEXT

COLLAPSE

Growing up in poverty is one of the greatest threats to healthy child development. Poverty and financial stress can impede children's cognitive development and their ability to learn. It can contribute to behavioral, social and emotional problems and poor health.

This indicator is included in the KIDS COUNT Child Well-Being Index. Read the *KIDS COUNT Data Book* to learn more: http://datacenter.kidscount.org/publications.

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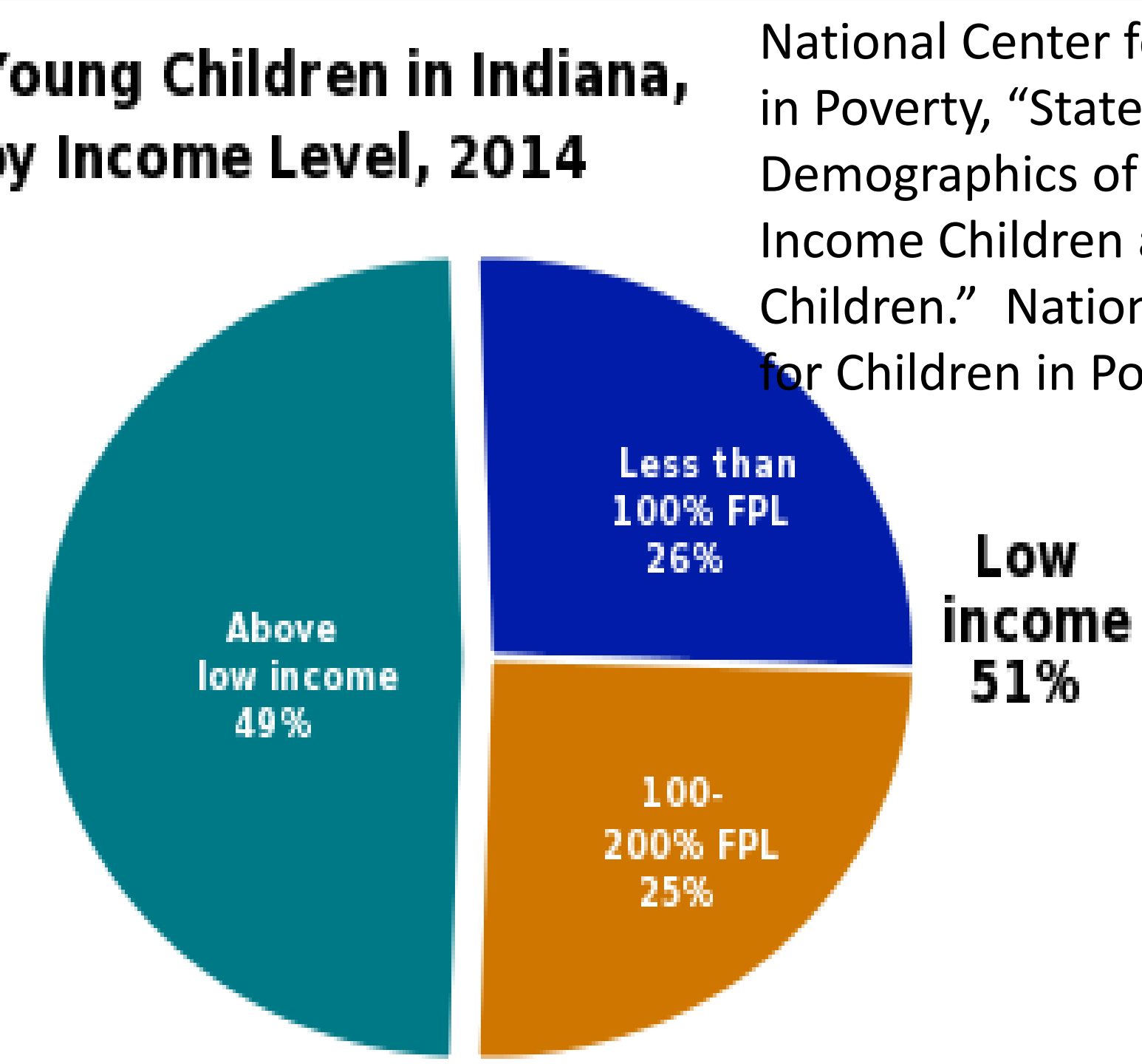

National Center for Children in Poverty, "State Profiles: Demographics of Young, Low-Income Children and Poor Children." National Center for Children in Poverty, 2014.

Children and Concentrated Poverty

Year(s): All | Data Type: All

Data Provided by: National KIDS COUNT

Location	Data Type	2000	2006 - 2010	2007 - 2011	2008 - 2012	2009 - 2013
United States	Number	6,301,000	7,879,000	8,591,000	9,362,000	10,067,000
	Percent	9%	11%	12%	13%	14%
Indiana	Number	48,000	135,000	151,000	182,000	198,000
	Percent	3%	8%	9%	11%	12%

INDICATOR CONTEXT

COLLAPSE

Concentrated poverty puts whole neighborhoods, and the people living in them, at risk. High-poverty neighborhoods are much more likely than others to have high rates of crime and violence, physical and mental health issues, unemployment and other problems.

This indicator is included in the KIDS COUNT Child Well-Being Index. Read the *KIDS COUNT Data Book* to learn more: http://datacenter.kidscount.org/publications

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Federal Reserve Chair Janet Yellen

- …four sources of economic opportunity in America--think of them as "building blocks" for the gains in income and wealth that most Americans hope are within reach of those who strive for them

-

Janet Yellen, Chair, Board of Governors, Federal Reserve System of the United States. "Perspectives on Inequality and Opportunity from the Survey of Consumer Finances." Federal Reserve Bank of Boston, October 17, 2014

Federal Reserve Chair Janet Yellen

- …four sources of economic opportunity in America--think of them as "building blocks" for the gains in income and wealth that most Americans hope are within reach of those who strive for them

- The first [is] widely recognized as important source of opportunity: *resources available to children in their most formative years*….One of the most consequential examples is early childhood education

Janet Yellen, Chair, Board of Governors, Federal Reserve System of the United States. "Perspectives on Inequality and Opportunity from the Survey of Consumer Finances." Federal Reserve Bank of Boston, October 17, 2014

- 75% of 18 year olds cannot get a job as a private in the US army

Ready, Willing and Unable to Serve A report by Mission Readiness, Military Leaders for Kids www/cdn.missionreadiness.org

- 75% of 18 year olds cannot get a job as a private in the US army *because*
  - Lack of diploma
  - Health (obesity, asthma)
  - Criminal record
  - Drug / alcohol

Ready, Willing and Unable to Serve A report by Mission Readiness, Military Leaders for Kids www/cdn.missionreadiness.org

Benefits of Early Intervention Programs

- Academic achievement
- Behavior
- Educational progression and attainment
- Delinquency and crime
- Labor market success

Cannot Get a Job as a Private in Army

- Lack of diploma
- Health (obesity, asthma)
- Criminal record
- Drug / alcohol

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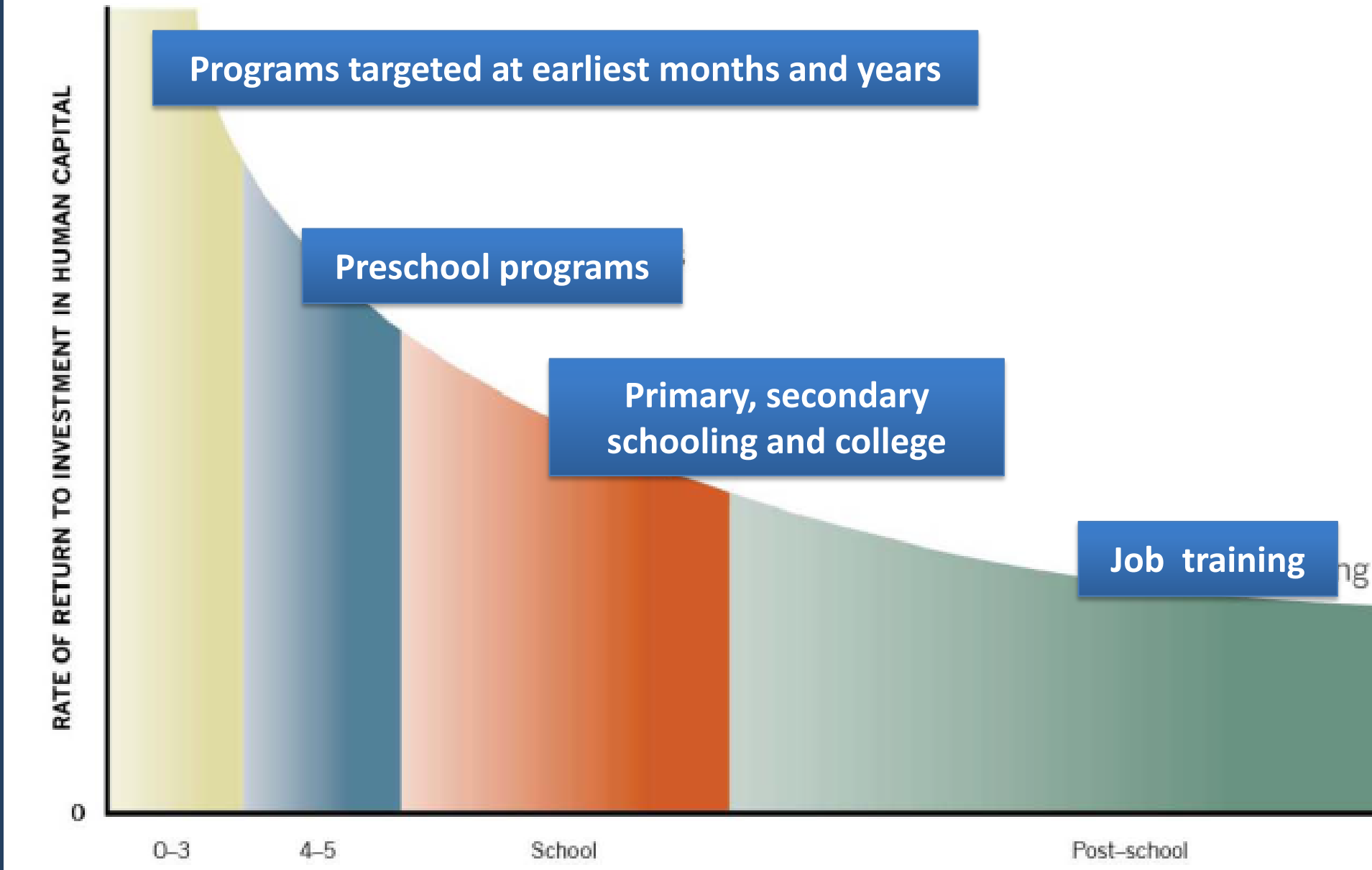
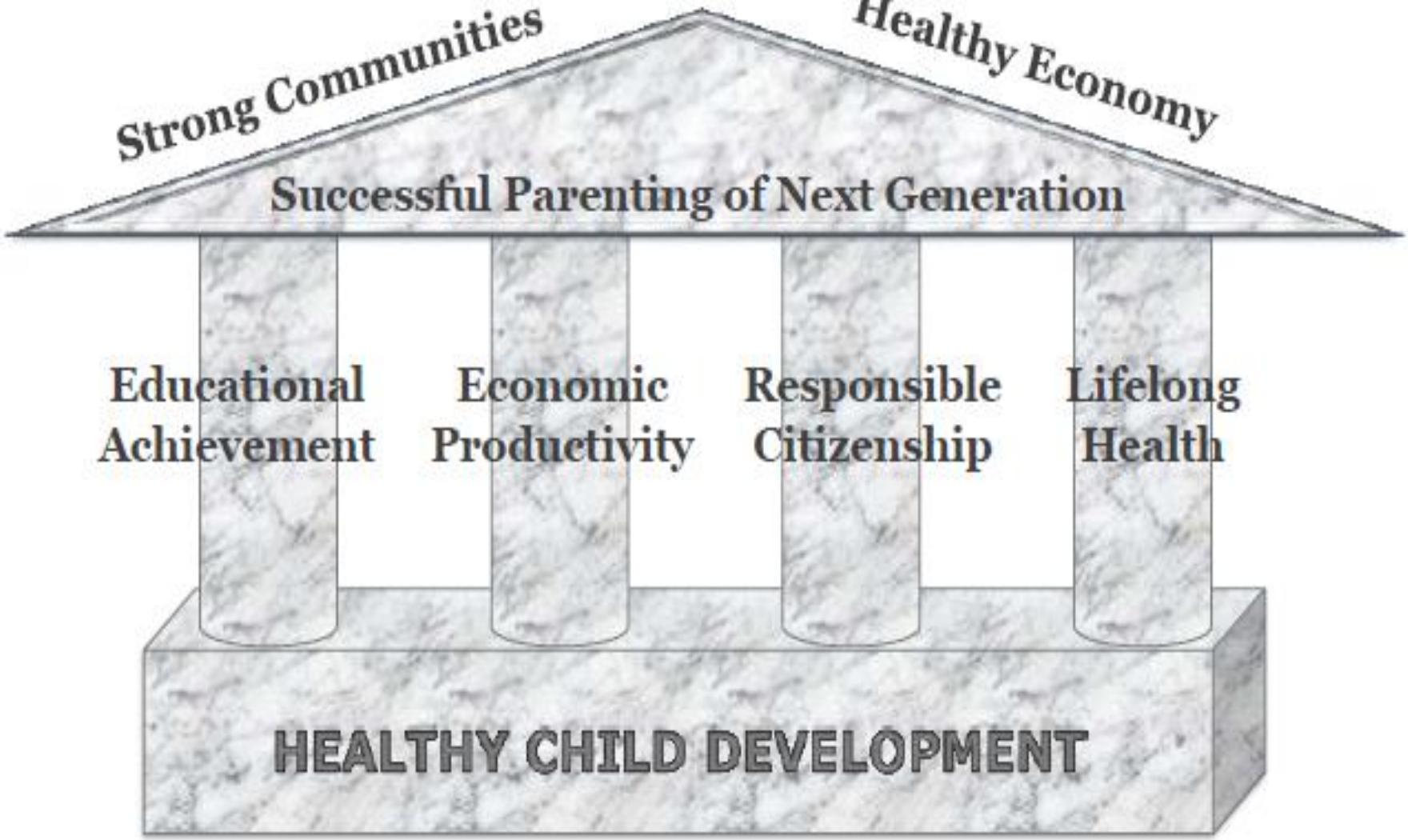


Source: James Heckman, Schools, Skills, and Synapses, *Economic Inquiry*, 2008



http://www.readynation.org/uploads/db_files/Early%20Brain%20Research%20Presentation%20-%20Center-ReadyNation%20Econ%20slide%20FOR%20WEB53.pdf

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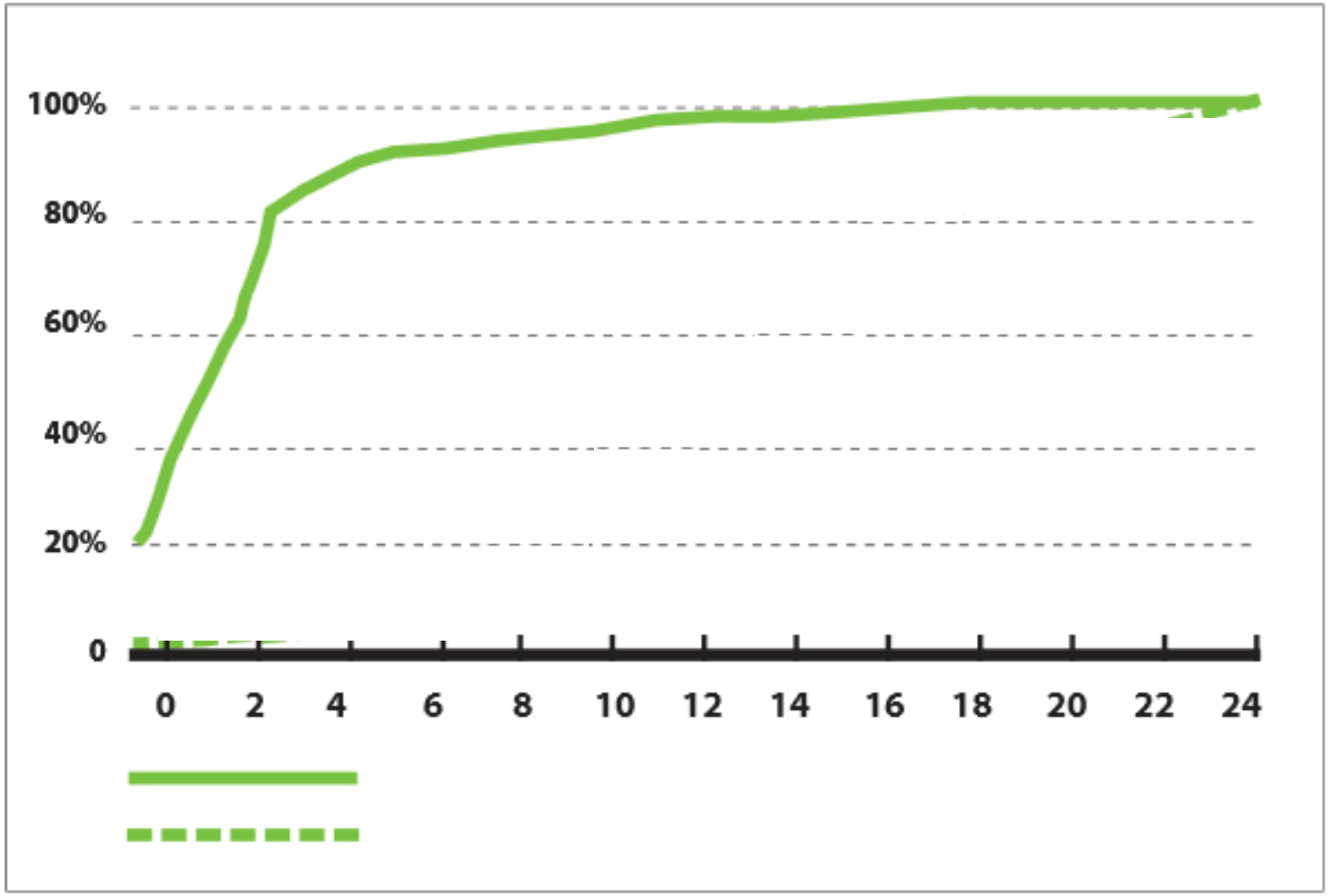
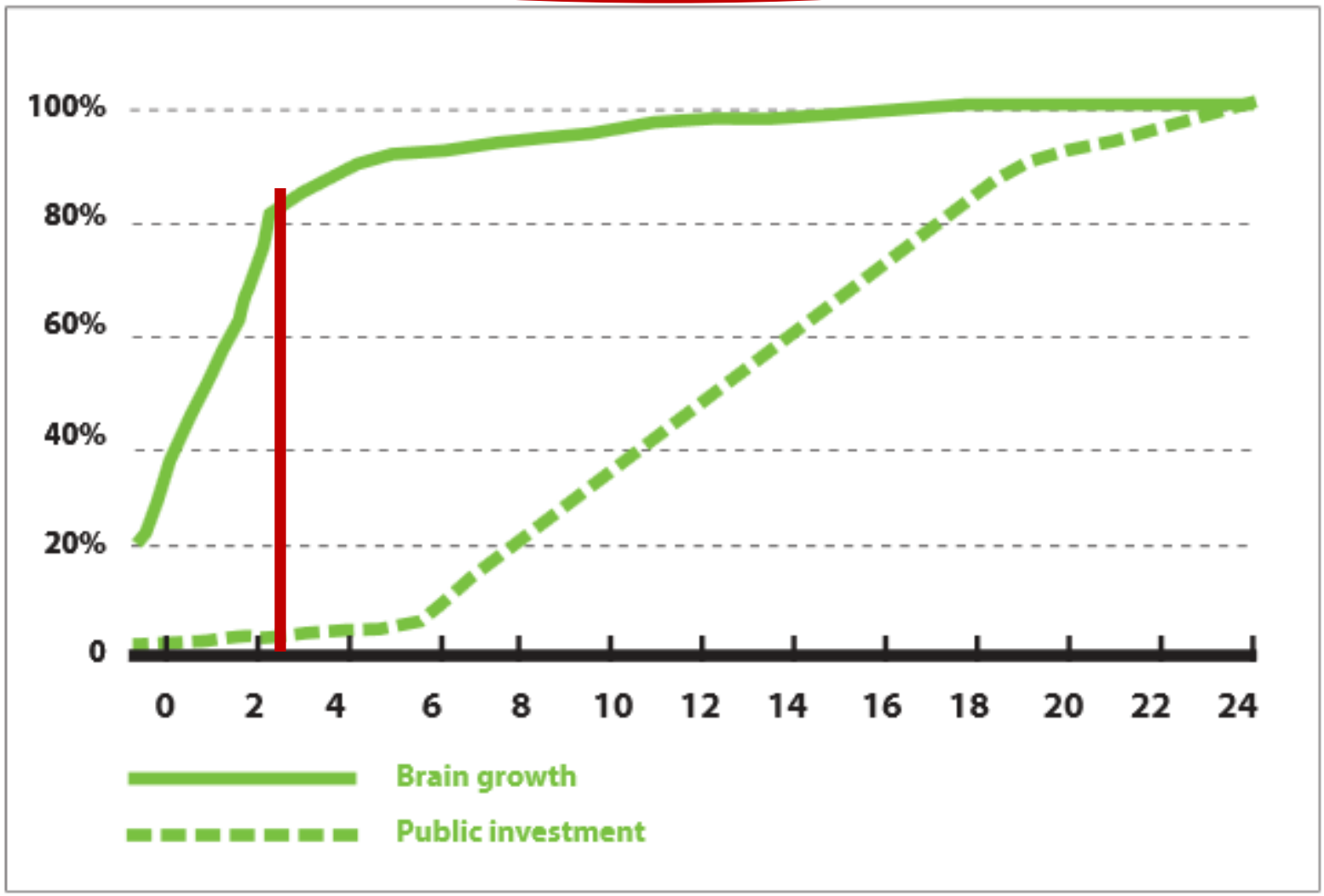


Source: Early Learning Left Out, Voices for America's Children and the Child and Family Policy Center, 2004.

Brain Growth and Public Investment



Source: Early Learning Left Out, Voices for America's Children and the Child and Family Policy Center, 2004.

Moments in America for Children

- Every 34 seconds a baby is born into poverty.
- Every 67 seconds a baby is born into extreme poverty.
- Every 1 1/2 minutes a baby is born at low birthweight.
- Every 22 minutes a baby dies before their first birthday.

http://www.childrensdefense.org/library/moments-in-america.html#sthash.Qsv037by.dpuf

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Where America Stands Among Industrialized Nations

- 1st in Gross Domestic Product
- 1st in the number of millionaires and billionaires
- 1st in health technology
- 11th in the proportion of children living in poverty
- 16th in efforts to lift children out of poverty
- 17th in rates of low-birthweight births
- 22nd in infant mortality

http://www.thechildrensinitiative.org/didyouknow.htm

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Improving early identification and diagnosis of developmental delay and autism spectrum disorders

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THANK YOU!!!

What is Autism Spectrum Disorder?

- A group of complex disorders of brain development
- Characterized by difficulties in
  - Social communication (verbal and nonverbal)
  - Restricted interests / repetitive behaviors
- Associated with intellectual disability in 50-70%
- Most obvious signs and symptoms of autism emerge between 2 and 3 years of age

http://www.cdc.gov/ncbddd/autism/index.html

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How Common is Autism?

- 1 in 68*
  - Girls 1/252
  - Boys 1/54 (4-5 X more common than girls)
- 10X increase in prevalence in 40 years

http://www.cdc.gov/ncbddd/autism/index.html

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What Causes Autism?

- No one cause of autism and no one type of autism
- Gene changes or mutations associated with autism
- Combination of autism risk genes and environmental factors influencing early brain development
  - genetic predisposition to autism
  - nongenetic, or “environmental,” stresses -- advanced parental age at time of conception (both mom and dad), maternal illness during pregnancy and difficulties during birth

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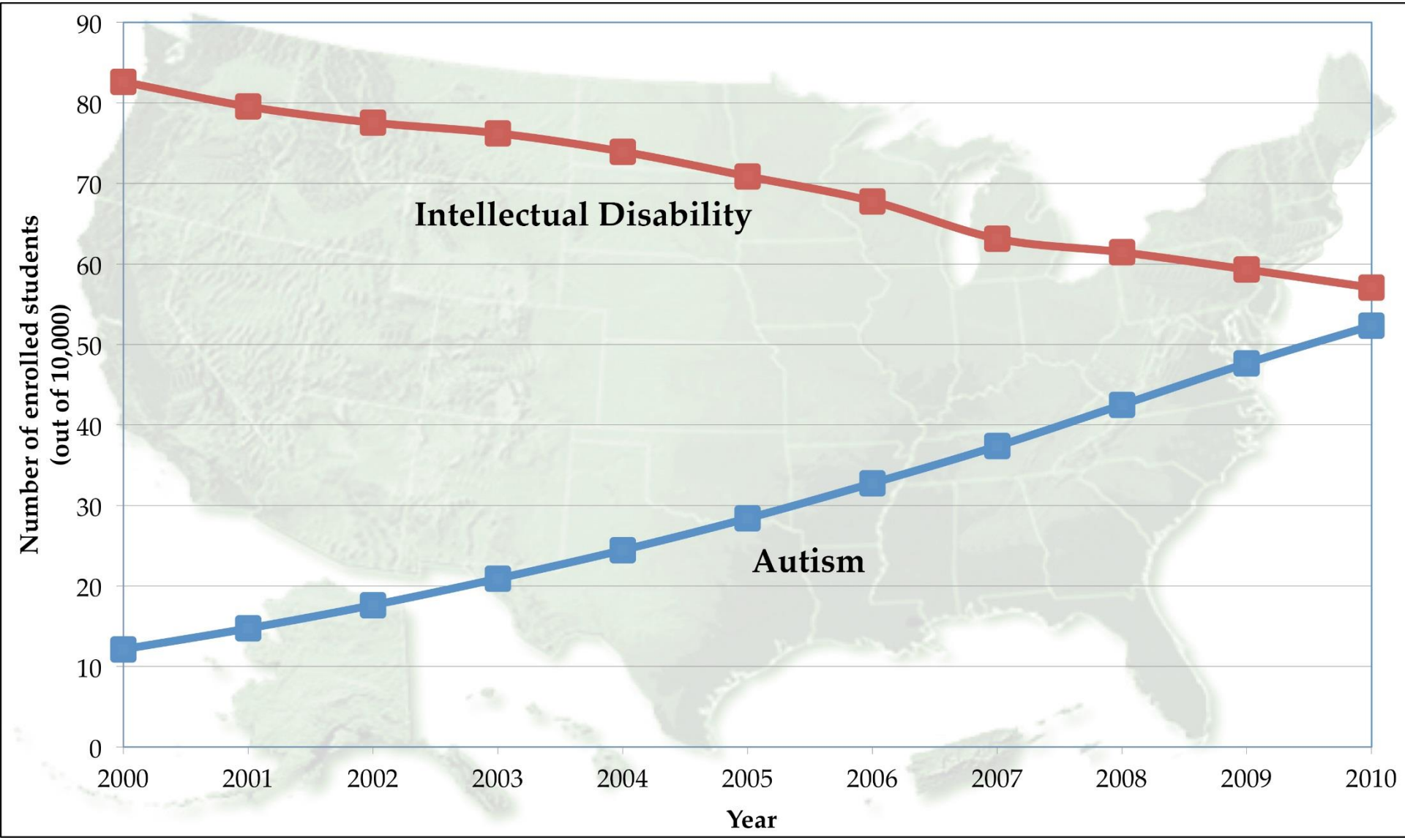

http://science.psu.edu/news-and-events/2015-news/images/research/bmb/image-related-to-research-by-santhosh-girirajan

When Can ASD Be Identified?

- Sibling research (Mitchell et al, 2006)
  - 12 month - differences in gesture and receptive language
  - 15% siblings had ASD at 2 years of age
- Home movies looking back at children with ASD at 12-18 months of age (Palomo et al, 2006)
  - Less pointing to share an interest
  - Less eye contact as integrated communicative act
  - Less communicative babbling
  - No response to name
  - Confirms a regression in a third (33-39%)
- Screening 18 and 24 months of age with tool

http://www.cdc.gov/ncbddd/autism/index.html

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